

Editorial

INDUSTRY VIEWPOINTS

Open Season for Experts

THIS is the time of the year when industrialists listen to the economic experts. They lay aside their own experience, their own imagination and cock their ears to the prophets of doom, cheer or "no change."

Businessmen are told things are going to the dogs. They are not going to the dogs. Or at such and such a time they may go to the dogs. They are told this is not the time to expand. It is the time to expand.

Then comes taxes. They are getting bigger and bigger. Sales will slump. No they won't slump. Well maybe they will slump or not slump if the variables—things which gum up predictions—change.

The experts then get specific. The next 6 months will be good—maybe. But, oh boy! Watch out for the midyear. Because then something may happen. Things may go to pot or they may not go to pot. These predictions are often couched in pontifical phrases. Sometimes they are short and concise. But the message is always the same—we are in for trouble.

No one knows better than the businessman that we are in for trouble. And no one knows better than he does that trouble is constant but making a profit is a hard job—and variable.

Experts have been telling us for the past 3 years that a bust is on the way. Sure it's on the way. But businessmen cannot stop and wait for it to happen. They have work to do.

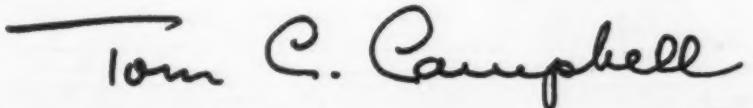
Taxes are going up and up. Wages and pensions will take a big bite out of profits. And prices will go up more next year to pay for these things.

The experts may be right. It is just a matter of time. But you who read this are just as good as the experts. Your opinion about your business and what will happen to it over the next 6 months is better than that of most of the experts.

But your business is not experting. It is producing, selling, advertising, buying, imagineering—all for one purpose: To make money for your company. Also to make a better product. To beat the daylights out of your competitor. Your job is to pick up the ball and run. How can you do this if you spend half your time listening to people who tell you you can't do what you are being paid to do?

We need the experts. But only to the extent that they fit into the whole picture. Read the prognostications. But remember that the experts also suffer from the jitters. They have troubles at home. They, too, have butterflies and relatives and troubles galore. Maybe that's why gloom is most often predicted. It may come. It probably will come, but there is plenty to do while we are waiting.

Your competitor wants you to heed the gloom stories. If he could he would mail you hundreds of them hoping that you will give up just long enough for him to put one over on you. Don't let him do it.



Editor

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by BRIDGEPORT BRASS COMPANY "Bridgeport" Headquarters for BRASS, BRONZE and COPPER

Proper Annealing for Cost Reduction

Work-hardened metal can be softened by annealing—that is, by raising its temperature high enough to affect its microstructure. Different degrees of softness are obtained by controlling the temperature which the metal attains in the furnace and the length of time it is exposed to the heat. Under the microscope a piece of annealed metal that has been prepared by polishing and etching for microscopic examination appears to be made up of irregularly shaped crystals or grains—the higher the annealing temperature, the larger the crystals, the softer the metal, and the greater its elongation or ductility.

Annealing Hints for Fabricators

Variable factors such as the weight and distribution of load, size and shape of article and/or sequence of anneals, type and condition of furnace play such an important part in maintaining uniform metal temperature that it is impossible to set up specific rules for the fabricator on time and temperature for annealing copper and its alloys.

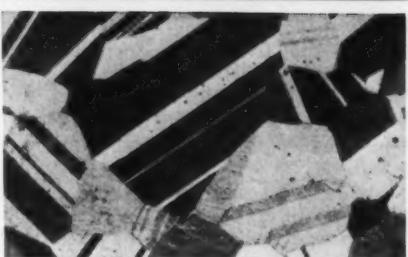
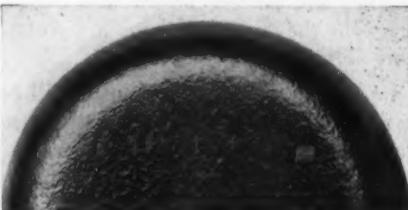
The table, shown below, on suggested temperatures should only be used as a guide.

Included also in these variables are the amount and method of cold-working, previous grain size and severity of operations to follow. Because of these variables, it is advisable to experiment

with sample lots to determine correct time and temperature for annealing before setting up a schedule for volume production.

Danger of Too High Temperature

Extra large grain size and orange peel effect are usually products of temperatures that are too high with subsequent increase in finishing costs. Excessively high temperatures will also increase the amount of oxidation of the



Orange-peel surface on the bottom of drawn brass cup was caused by excessively large grain structure resulting from annealing at too high a temperature. Micrograph: mag. 75 x etch NH₄OH and H₂O.

Suggested Annealing Temperatures for Fabricated Articles

Approximate Metal Temperatures

Material	Alloy No.	Anneal for Additional Cold Working	Fine Grain Anneal for Finishing	Stress Relief Anneal
Copper	102	750- 950F	650- 800F	400F*
Red Brass—85 copper, 15 zinc	85	900-1150F	750- 900F	400F*
Cartridge Brass—70 copper, 30 zinc	37	850-1100F	700- 850F	400F*
High Brass—66 copper, 34 zinc	1	850-1100F	700- 850F	400F*
Commercial Bronze—90 copper, 10 zinc	25	925-1175F	775- 975F	400F*
Silicon Bronze—97 copper, 3 silicon	632	1000-1200F	925-1000F	400F*
Silicon Bronze—98 copper, 2 silicon	609	1100-1200F	925-1000F	400F*
Phosphor Bronze—Grade A—94.35 copper, 5.5 tin, 0.15 phosphorus	36	1080-1200F	900-1050F	400F*
Nickel Silver—18% Grade A—65 copper, 18 nickel, 17 zinc	565	1100-1300F	1050-1150F	400F*

*Stress Relief Annealing Temperatures and Time depend upon the amount of cold working on the part and the alloy. A nominal temperature of 400F for a one hour anneal may be tried and the parts so treated then checked for residual stress by a mercurous nitrate test. Should failure occur, a higher temperature would be indicated.

metal (if non-atmosphere controlled furnaces are used) and thereby necessitate longer pickling and dipping operations, with the associated danger of pitting and thinning of the material.

It is safer to anneal at the lowest temperature possible. Work can always be returned to the furnace if not annealed sufficiently, but the damage done by too high a temperature cannot be corrected.

Good Annealing Practice

Thorough cleaning of work to remove drawing compounds before annealing especially at low temperatures, will help to maintain cleaner surfaces. Dirt and dust picked up from the air and held on the work by compounds, can also produce stains and scale which if not completely removed, will cause scratching of work and dies as well as loading of tools.

The ability to obtain uniform metal temperatures in the work being treated is essential. For this reason convection-type annealing furnaces are widely used for temperatures from 1200° F and lower. By placing the thermocouple at the hottest location of the incoming gases and being careful not to exceed the desired temperature is an assurance metal will not be overheated.

The practice of speeding up the annealing operation by first operating the furnace at temperatures considerably above the desired annealing temperature is dangerous because the top or edges of the load may become overheated while the rest of the load is coming up to the desired annealing temperature. In other words, there is time lag in heat penetration. It is advisable to bring the furnace to heat before starting the day's annealing operations. This method reduces the danger of local overheating and facilitates uniform heating.

The influence of time in an annealing operation after the metal reaches the desired temperature throughout does not seriously increase grain growth or softening and this factor permits uniformity of heating in convection furnaces even when section or portions of a load are of uneven mass. Direct-fired furnaces, on the other hand, are usually operated with a thermal head and are more susceptible to uneven heating of a load, especially if the masses are uneven.

NEWSFRONT

NEWS, METHODS AND PRODUCT FORECAST

► The brass industry is undergoing a modernization program so extensive that it approaches a technological revolution. Scovill has just spent \$10 million streamlining its production with new handling and finishing equipment embodying several innovations. Continuous casting of semifinished slab stock is the heart of the new setup. Bridgeport Brass, which has revamped extensively, also bases production on continuous casting.

Another brass company planning radical changes is thinking about expenditures in the neighborhood of \$50 million.

► Controversy waxes hot in Quebec over the long-range question: For Canadian production, should the Ungava's ores be handled in conventional blast furnaces or Tysland-Hole electric furnaces? Discussions contemplate facilities for 6 million tons of pig iron although some interests have suggested integrated plant costing around \$1.5 billion.

► Despite the steel sheet shortage, appliance makers are not switching to substitutes as they did in the past. Most washing machine makers have decided to wait for steel for their tubs.

► Current credit terms on purchase of construction machinery are under pressure. Manufacturers are being asked to waive the standard 20 to 25 pct down with balance in 12 to 18 months terms in favor of no down payment and a longer installment period.

► The Navy--mindful of the possibility of arctic warfare--is putting an external combustion engine through a life test at its Annapolis experiment station. An adaptation of an old design, the engine can burn coal or wood entirely outside the cylinder, while only air is used inside. It is quiet and can be used in extremely low temperatures.

► Russia picked up the entire German magnesium industry as loot after the war and presumably will soon be using these facilities--rated at 60 million lb annually--for production in the Soviet Union.

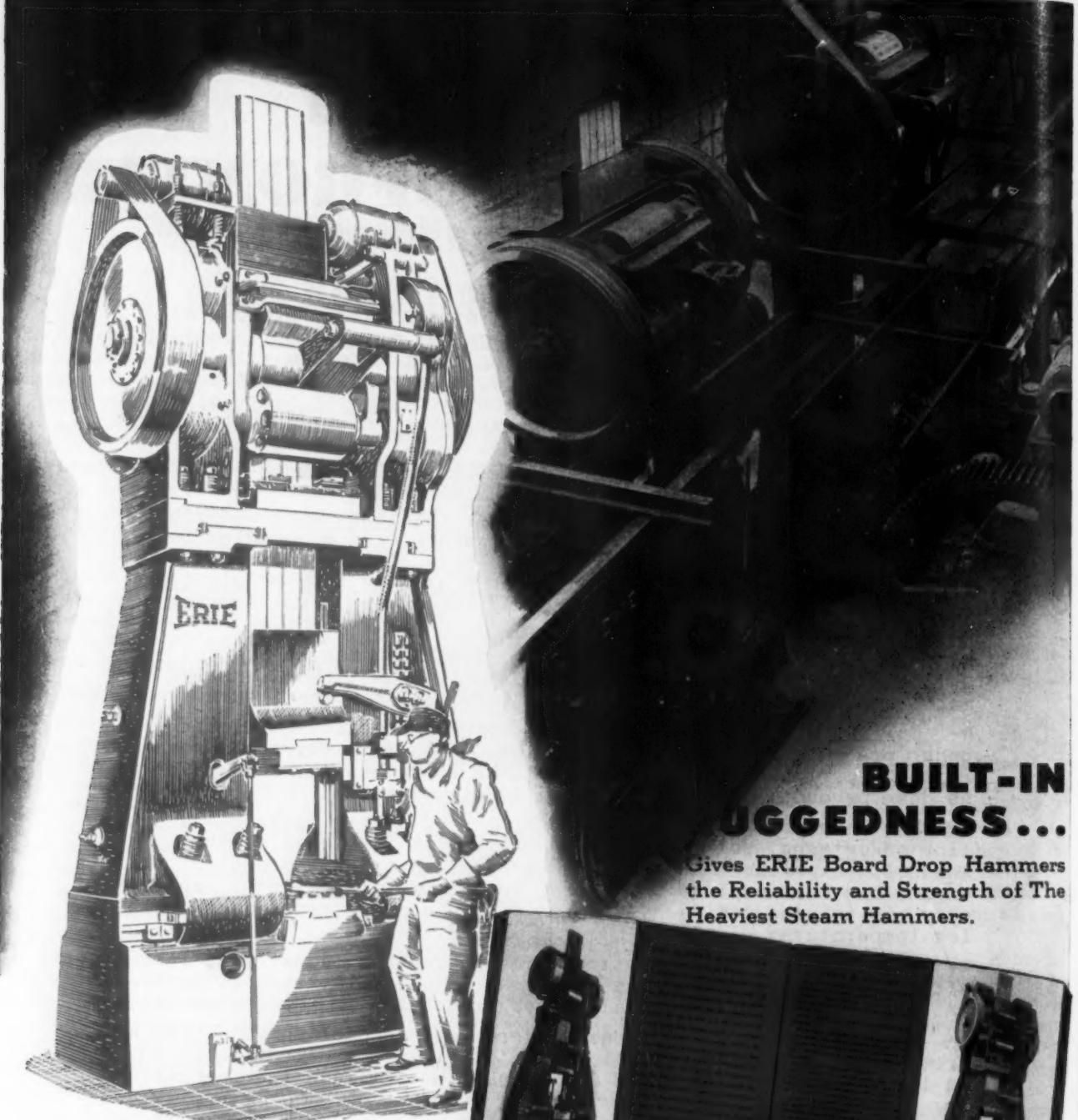
► It will probably be 5 years before real accomplishment shows up from recent Russian compilation of a 14-volume technical handbook, on the order of the ASTE and SAE manuals but it lays the foundation for a new type of technology there.

Meanwhile, efforts are being made to introduce new machinery and improve maintenance on the old, despite ingrained reluctance to give up obsolete machines and vehicles.

► Despite firmness of major steel prices--with scattered increases coming weekly--castings prices remain soft. Buyers of steel, gray iron and malleable castings report that competitive bidding and price cutting are still prevalent.

► A new optical instrument for low cost inspection of small parts will be introduced this spring. It can be used to check lineal measurements, angles, radii, chamfers, threads, wear on cutting tools, etc., as well as for production checking.

► The best reason advanced yet for the current prosperity of the automobile industry is that it has doubled the number of dollars it takes out of the customer's pocket. Statistics show that out of every \$100 now spent by the American people on consumer purchases, \$6.20 goes for automobiles and parts. In 1939 automobiles and parts accounted for only \$3.10.



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Scrap Market Is Again Weaker

Steel Rate Up 2 Points To 94

Sheet Demand Still Abnormal

The Iron Age

SUMMARY

IRON AND STEEL INDUSTRY TRENDS

THE price of steelmaking scrap, normally a good barometer of future steel business, has softened enough during the past 3 weeks to give some observers the jitters. But indications are that scrap market weakness will have to last longer and be more pronounced than it has been before it can be called a sure sign of an early decline in steel production.

Several factors point toward excellent steel business during the first quarter of next year and reasonably good prospects for the entire first half. Most important, there has been no increase in steel order cancellations in the past month, as there was before the drop in steel output this spring. Mill schedules, particularly on flat-rolled products, are at least as heavy today as they were during the second quarter of 1949, when steelmaking operations averaged 91 pct of rated capacity.

Most Scrap Above Prestrike Level

The IRON AGE scrap steel composite price, at \$27.25 per gross ton this week, is still above the September average of \$25.66 per gross ton. This figure, the average of No. 1 heavy melting steel scrap at Pittsburgh, Chicago and Philadelphia began the year at \$43 a ton, held above \$30 through March and drifted down through the \$20's until it hit the year's low of \$19.33 at the end of June. After this drop, the steel ingot rate fell from 82 pct in June to 71 pct in July. Scrap prices remained at or near the year's low until August when they—along with steel operations—moved up. The scrap composite softened during the steel strike, turned stronger in November and then began to slip late that month from a November peak of \$29.92 a ton.

The scrap market is expected to be dull for the rest of December. By mid-January both it and the steel order and cancellation pattern should give a much better indication of the future. Until then the current weakness in scrap may be interpreted as a technical correction—a combination of good mill inventories and heavy stocks in dealers' and brokers' yards. Steel ingot opera-

tions for this week, at 94 pct of rated capacity, are up 2 points above last week's rate.

Sheet Still Heavily Booked

The steel mill order pattern is still good. Some companies are booked solidly through June on sheets; others have not opened second quarter sheet order books—but could fill them if they did. On other products Chicago bookings are heavier than those at Pittsburgh and eastern mills. Some midwestern steel buyers are going east for their needs rather than tie themselves up with conversion deals that might waste a lot of money should steel supply turn easy before the conversion deal is completed. Few conversion arrangements have been made outside of the auto industry, though one implement maker has just arranged for a small tonnage. Not all of the auto industry is 100 pct signed up for conversion steel deals and manufacturers who have not lined up conversion tonnages apparently intend to wait it out.

Steel Delivery Dates Being Met

Three reasons for less interest in new steel sources are: (1) The conviction that the sheet scarcity will not last too long; (2) caution has replaced the willy-nilly conversion contracting of a year ago; and (3) steel companies are meeting delivery promises. Apparently the day when a steel company would promise tonnage just to take off customer pressure is over. A year ago many did just that.

There is another reason conversion has not caught on widely despite heavy mill order bookings. It costs more and it generally requires a contract. Placing an order with a mill is only an option to buy—it can be cancelled. Some steel sales officials are looking at current heavy backlog with a cold eye feeling sure they are too good to last. These men know that enough business to justify running at 10 pct below current rates would be quite good for the larger companies. They are certain that the present tight situation in most products is an outgrowth of the strike unwarranted by even the currently good business outlook.

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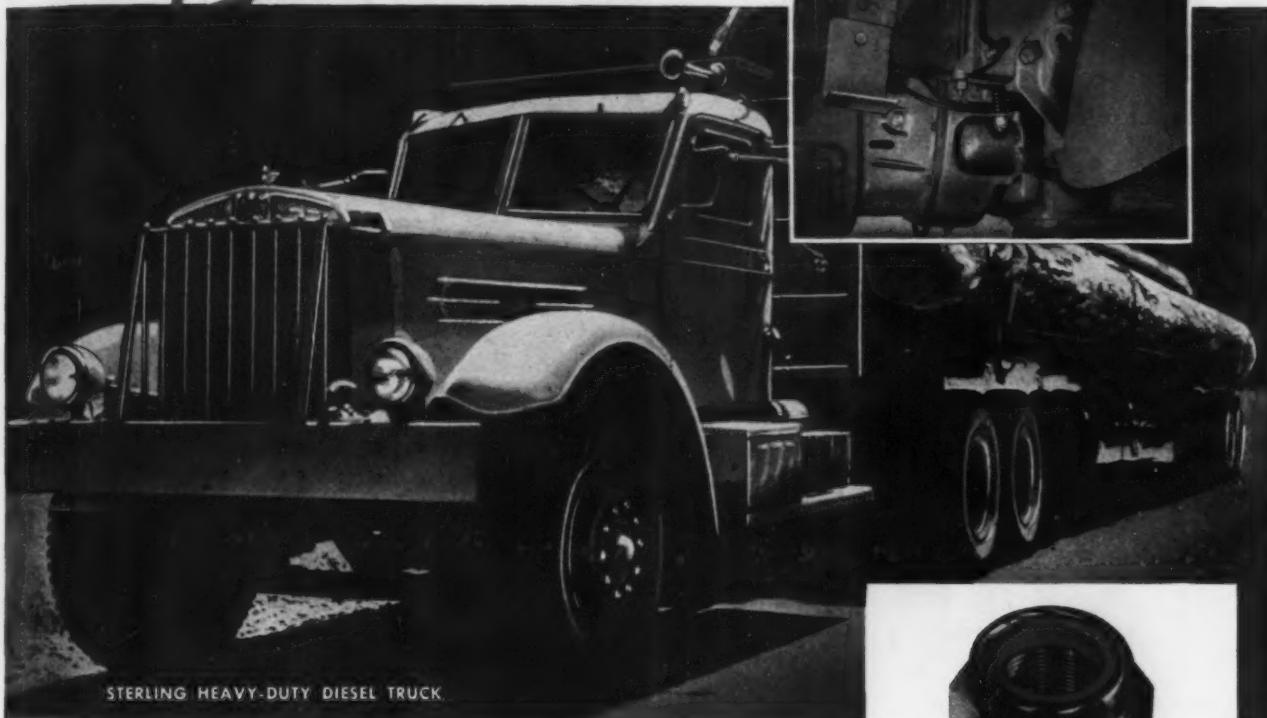
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SAVE PRODUCTION TIME... MONEY**



STERLING HEAVY-DUTY DIESEL TRUCK.

**The Red Elastic Collar Keeps
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Sterling found that Elastic Stop Nuts provided the necessary positive fastening security at lower cost. Why? Because Elastic Stop Nuts lock in position anywhere on a bolt or stud—and only ONE adjustment is necessary—the first. The self-locking, self-sealing Red Elastic Collar provided the "grip-dependability" Sterling needed to keep their precise

settings permanent. No amount of vibration, impact or heavy field duty can shake Elastic Stop Nuts loose.

And all Elastic Stop Nuts keep bolt and nut threads rust-free... seal against liquid seepage along bolt threads... do not damage the threads... and are reusable.

HERE'S A CHALLENGE: Send us complete details of your toughest bolted trouble spot. We'll supply test nuts—FREE, in experimental quantities. Write: Elastic

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Threadless and permanently elastic, it provides these 4 outstanding features:

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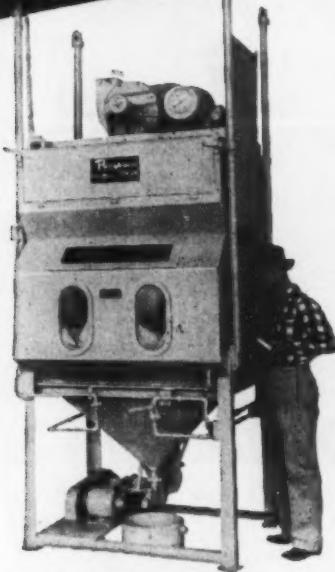


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Fatigue Cracks

By Charles T. Post

What Else?

Your favorite family journal's Joseph Halloran, who keeps the subscribers along the Atlantic Coast happy, turned in a territory report the other day headed "Boston Proper."

Since a somewhat rowdy tea party some three centuries ago, that was the first hint we'd had that Boston might be anything else.

Clip Joint

If you've been wondering about that sharp look that the 1950 model automobiles are sporting, you'll be



interested to know there's a strong psychological link with at least one of the men who designed them.

Our Department of Incidental Intelligence has discovered that automobile engineers ride some strange hobbies. One well-known automotive expert invents gadgets for cutting his own hair. He's been successful enough at it so that he hasn't had to patronize a barber shop for more than 2 years.

As shown in the accompanying photograph it has required some original thinking to develop a scissors-and-comb combination that is workable. The comb is held firmly in place by means of a clip attached to one of the blades. The tang of the comb fits into a spring pocket and can be transferred from one side of the scissors blade to the other, making it possible to use either hand for cutting. It will be observed that the blade holding the comb remains stationary during the cutting stroke.

"Some skill must be developed to use the device," the inventor declares, "but it works very successfully after a little preliminary instruction and practice." Anybody who prides himself in having skill in his hands can learn to use it, we are assured.

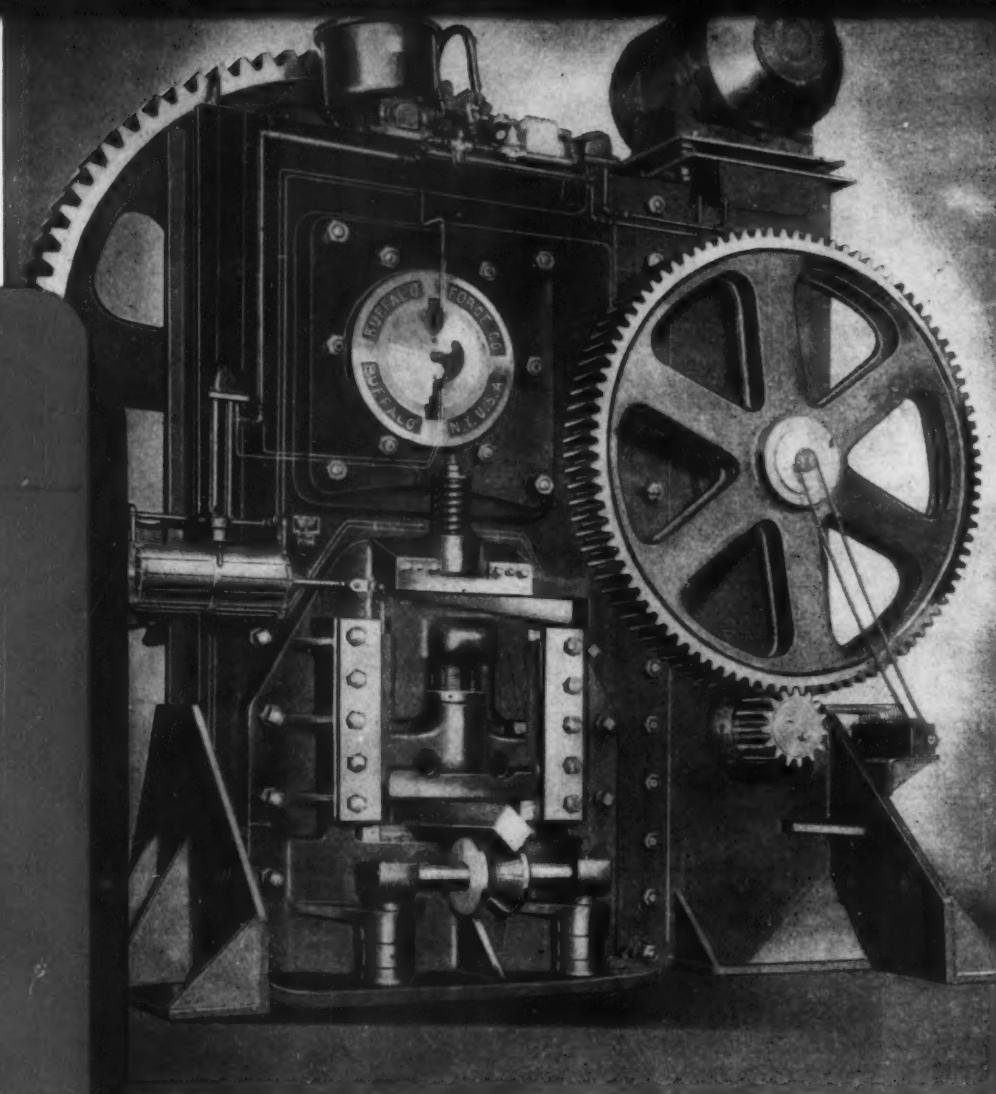
Construction of the device is simple, consisting of several small forgings or castings and some pressed metal parts. At the present time the device is not being manufactured for sale.

As Ye Know It

The Ohio State University Engineering Experiment Station addresses its "News" destined for your f.f.j. to "The Iron Cage." Confining, what?

Turn to Page 176

6 CUTS
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R. J. LECKRONE, chief engineer, Mackintosh-Hemphill Co.



D. J. DAVIS, director of manufacturing engineering, Ford Motor Co.



J. D. HARBAUGH, manager of Detroit plants, Chevrolet Div., General Motors Corp.

R. J. Leckrone has been appointed chief engineer of MACKINTOSH-HEMPHILL CO., Pittsburgh. Mr. Leckrone will direct the company's engineering of rolling mill equipment and also assist in the machinery sales program. Mr. Leckrone has been affiliated with the Lewis Foundry & Machine Div. of Blaw-Knox Co. where he served for 8 years as chief designing engineer.

Maxwell R. Sacra has been elected a director of the BLACK & DECKER MFG. CO., Towson, Md., replacing Harry O. Norris who has resigned. Mr. Sacra, who is export manager of the company, has been with the company since 1927.

E. O. Thomson, for many years with Carnegie-Illinois Steel Corp., has joined the BUSHWICK IRON & STEEL CO., INC., Brooklyn.

D. J. Davis has been appointed director of manufacturing engineering of the FORD MOTOR CO., Dearborn, succeeding Roy T. Hurley, who resigned to become president of Curtiss-Wright Corp. Mr. Davis was associated with the Cadillac Div. of General Motors for 21 years and then joined the Avco Corp. in 1942. He became chief industrial engineer of Avco in 1948, his last post before joining Ford.

Abraham Remstein has been named special representative in connection with the buying of white metal scrap and residues of Federated Metals Div., AMERICAN SMELTING & REFINING CO., Newark. Mr. Remstein joined the company in 1914 and since 1924 he has been superintendent of the manufacture of white metal alloys at the Newark plant.

J. D. Harbaugh, plant manager of the Chevrolet-Detroit Gear & Axle Div., GENERAL MOTORS CORP., has been named manager of the Detroit plants. **R. W. Podlesak**, plant manager of the Chevrolet assembly plant at Janesville, Wis., will succeed Mr. Harbaugh as plant manager of the Detroit Gear & Axle Div. **J. L. Coyle**, plant manager of the Chevrolet-Muncie Div., will succeed Mr. Podlesak as manager of the Janesville plant. **A. R. Roskilly**, general superintendent of production at the Detroit Gear & Axle Div., will succeed Mr. Coyle as plant manager of the Muncie operations.

A. C. Spurr has been elected a member of the board of directors of the WHEELING STEEL CORP., Wheeling, W. Va. Mr. Spurr is president of the Monongahela Power Co.



HARRY L. BIALOCK, manager of sales, Tubing Specialties Div., National Tube Co.

Harry L. Bialock, manager of sales of NATIONAL TUBE CO., Atlanta, has been promoted to manager of sales of the tubing specialties division, succeeding David T. Marvel, who has resigned. Charles J. Lundvall, salesman in the New York district office, has been appointed manager of sales at Atlanta. Mr. Bialock has been with National Tube since 1936 and has held various postions with the firm. Mr. Lundvall has been with the company since 1926 and has been a salesman and field engineer since 1930.

Sumner L. Young has been appointed purchasing agent of AMERICAN BOSCH CORP., Springfield, Mass. Mr. Young has been associated with American Bosch since 1942. He has served in various engineering capacities, recently as section engineer in the Fuel Injection Div.



R. EWART STAVERT, director, International Nickel Co. of Canada, Ltd.



ROBERT W. PERSONS, product sales manager, Drill Steel Div., Crucible Steel Co.

R. Ewart Stavert has been elected a director of the INTERNATIONAL NICKEL CO. OF CANADA, LTD., Toronto. Mr. Stavert is president of the Consolidated Mining & Smelting Co. of Canada, Ltd.

Floyd N. Gardner has been appointed director of inspection for Buick Motor Div., GENERAL MOTORS CORP., Flint., succeeding Charles N. Ofield, who retired after nearly 42 years of service. Mr. Gardner has been with Buick since 1927 and has been assistant general inspector in charge of manufactured parts. Donald Taylor was named assistant general inspector to succeed Mr. Gardner.

Everett P. Russell has been named director of sales and customer relations for TEXAS GAS TRANSMISSION CORP., New York. Prior to joining Texas Gas, Mr. Russell has served such clients as Firestone Tire & Rubber Co., Fisher Body Corp., Chrysler Corp. and Metropolitan Portland Cement.

David S. McNally and Jack K. Williams have been appointed assistant parts and service managers of PACKARD MOTOR CAR CO., Detroit. Mr. McNally is assigned to eastern United States, and Jack K. Williams the western states. Mr. McNally came to Packard in 1946 as Cincinnati zone parts and service manager. Mr. Williams has been with Packard since 1945 and most recently was parts and service manager in the company's former midwestern region.

Robert W. Persons has been elected product sales manager of the Drill Steel Div., CRUCIBLE STEEL CO. OF AMERICA, New York. Associated with Crucible since 1930, Mr. Persons has specialized in sales and application services for drill steels and allied products. He came to Crucible from the George J. Atwell Foundation Corp. where he was a drill engineer.

Paul J. Havas has been appointed manager of the foreign distributors division of the WILLYS-OVERLAND EXPORT CORP., Toledo. Mr. Havas was formerly with the Weber Co., Los Angeles, as export manager and with Montgomery-Ward, Chicago, as manager of the farm machinery department of the export distributors division.

Ralph F. Gordon has been appointed vice-president of sales of the WEIR KILBY CORP., Cincinnati. M. J. Hassan has been named vice-president of engineering, J. G. Kreis vice-president of purchases, E. H. Schubert vice-president of operations and Ralph G. Detmer assistant to the president, sales and engineering.

B. Lake Henry has been appointed secretary-treasurer of the EQUITABLE EQUIPMENT CO., INC., New Orleans, succeeding H. S. G. Verlander, who has resigned. Mr. Henry who has been with the firm for several years and was formerly assistant to Mr. Verlander, will assume his new position on Jan. 10.

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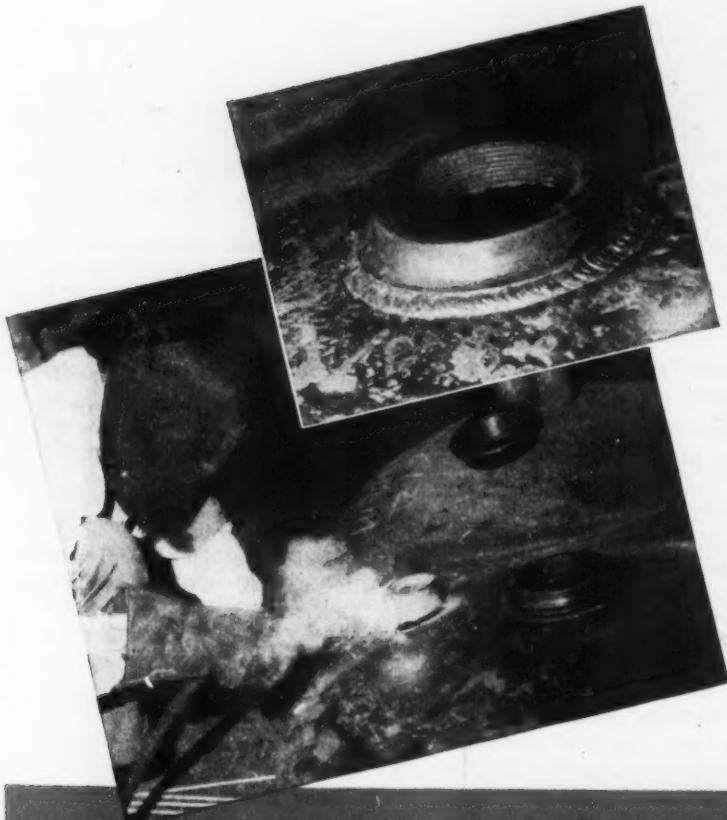


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This electrode is ideal for vertical and overhead welding jobs where welds of excellent appearance, high tensile strength, high ductility, and good impact resistance are particularly important.

The new W-22 has already proved itself in production tests . . . such as that at the Vulcan Steel Tank Company at Tulsa, where it was used in welding tank heads or end covers 36" in diameter and $\frac{1}{4}$ " thick. Note the good fusion and excellent appearance of the finished welds. Their Welding Superintendent reports this electrode has the most forceful yet easily controlled arc he has ever seen.

You can put your confidence in

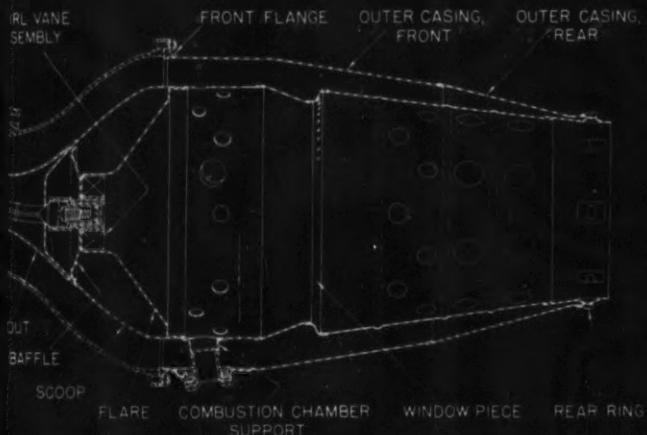
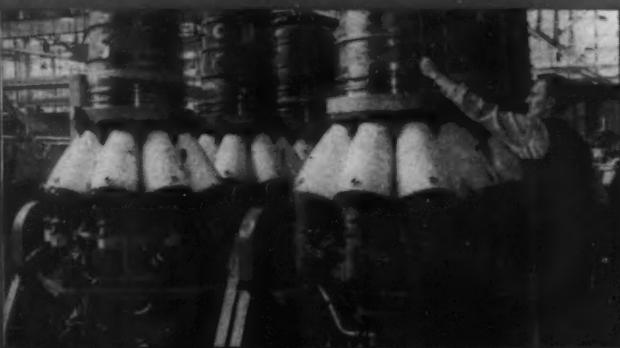
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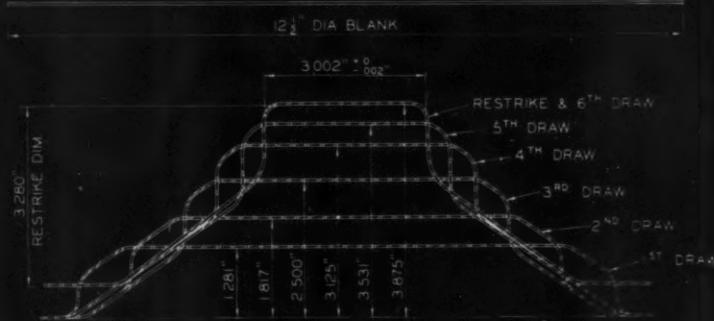
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Lake Erie Hydraulic Presses
help attain it in the production of
components for Turbo-Jet Engines



Cross-sectional diagram of the combustion chamber, or burner, of a JT-6 Jet Engine illustrating the assembly of stamped, deep-drawn and rolled and welded sheet metal parts. Components of high-strength, heat-resistant stainless steel and Nimonic 75 must fit "perfectly" to permit proper assembly and dependable operation of the engine. Flexible and precise control of the hydraulic presses makes close tolerance production of deep-drawn parts possible.



One of the most interesting deep-drawn parts in the combustion chamber assembly is the flame-tube flare. This part, which is made of 0.048-inch Nimonic sheet, requires six draws each of which is followed by bright annealing. Deep-drawn parts of austenitic stainless and Nimonic are subjected to severe cold-working. Draw depth is calculated on a basis of the degree of work hardening that occurs.

Two of the principal materials used in the construction of the JT-6 "Turbo-Wasp" Jet Engine are a stainless steel of 18-8 analysis and a heat-resistant chromium-nickel-iron alloy known as Nimonic 75. Jet engine parts made from these materials are subjected to high temperatures and fatigue resulting from high velocity air flow. To stand up in service for any appreciable time and to meet the exacting requirements for mating fits in welding, the parts must be formed to extremely close tolerances. In producing components such as the flame-tube flare, flame-tube scoop, flame-tube snout, combustion chamber supports and bar sleeves, hydraulic presses in sizes up to 400-tons are employed for the deep-drawing operations. The flexibility of control that is built into hydraulic presses makes it possible to form these high-strength, heat-resistant, austenitic materials into the various components efficiently and with the utmost precision.

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GLOBAL LETTER

REVIEW OF WORLD MARKETS



French budget stresses power development . . . Also includes expansion of steel rolling capacity . . . Brazilian government assists domestic coal industry.

Paris—The finance committee of the National Assembly has been given details of the 336 billion francs provided in the next budget. Of this total, 215 billion francs will be obtained as counterpart funds of the Marshall Plan. Credits provided are as follows:

Power:

National Coal Board, 56.5 billion francs

Electricity Board, 83.2 billion francs

Gas Board, 8 billion francs

Rhone National Co., 16 billion francs

Transportation:

National Railway Co. (loan), 25 billion francs

Air France (loan), 3.8 billion francs

Agriculture and Nitrogen, 30 billion francs

Industry and Trade, 31.7 billion francs

North Africa, 47 billion francs

Overseas territories, 33.5 billion francs

Others, 12 billion francs

Development of electric power will take the lion's share. From 23 billion kwh in 1946, it has already increased to about 30 billion kwh

in 1949. It is expected to reach 43 billion kwh in 1952-53.

Expanding Flat Capacity

Among the 31.7 billion francs for industry and trade the major part will be allocated for purchase and erection of a hot strip mill and a tinplate mill in Lorraine. These are to be built by the Societe Lorraine de Laminage Continu (SOLLAC). These new continuous rolling mills are necessary to meet increasing demand for flat products.

Including the hot strip mill being built in the north at Denain and the cold rolling mill which is to start production early next year at Denain, the two sets of mills in the North and the East will have a combined output of about 1.2 million tons of flat products. Requirements, including exports, are estimated at 2 million tons.

Brazilian Government Aids Its Domestic Coal Industry

Sao Paulo—The Dept. of Mineral Production is co-operating with coal mine owners in carrying out experimental drillings with a view to extending the areas worked. Seven pits have been driven on property of the San Marco Coal Co.

Congress has voted additional credits to investigate reserves in Parana, San Paulo and Santa Catarina and for washing Serval coal in Rio Grande do Sul. The department believes output of the Santa Catarina fields can be tripled.

Costs Will Remain High

Until modern methods of mining and washing coal can be more widely introduced, production costs will remain high and national mines will be unable to compete with foreign coal. Mine owners, however, are unable or unwilling to invest further capital unless increased consumption is assured.

The present government is not disposed to impose heavy duties on imports in order to protect them. The courts have recently decided that the law obliging importers to acquire 20 tons of national coal for every 100 tons imported cannot be legally enforced.

Higher Freight Rates and Wage Demands Causing Alarm

London—Two recent events worrying to industrialists and disquieting to the government are the engineering workers' decision to press their claim for a pay increase of \$2.80 a week, and the prospect of a further increase in coal and steel prices because of higher transport charges.

A third event calculated to make the Cabinet sit up and think is the Conservative victory in New Zealand, which was accompanied by prognostications of a similar political change in Australia.

Turn to Page 180

THE IRON AGE



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**Permanent Mold
Gray Iron Castings
for HYDRAULIC APPLICATIONS**

- ★ Free machinability
- ★ Dense, non-porous structure
- ★ Freedom from leakage under pressure
- ★ Machines to high, mirror-like finish
- ★ Properly annealed; no growth or distortion after machining.

Eaton Foundry Division engineers will be glad to discuss the application of Eaton Permanent Mold Gray Iron Castings to your product. Send for the illustrated booklet, "A Quick Picture of the Eaton Permanent Mold Process for Producing Gray Iron Castings."

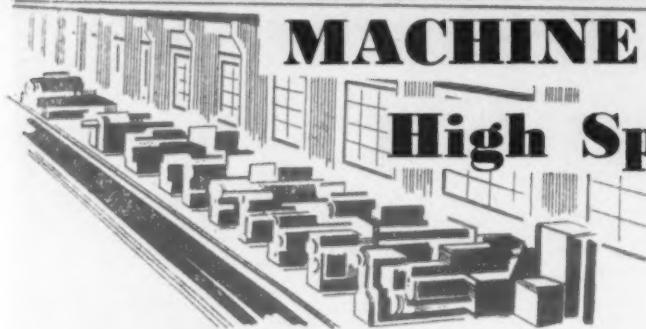


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MACHINE TOOL High Spots

Sales
Inquiries
and Production



by

William A. Lloyd

New order volume shows some improvement . . . Next year's prospects are promising . . . Factors noted for 1951.

Cleveland—As the machine tool industry entered the home stretch of 1949 this week, new order volume continued to show slight but steady improvement and foreign orders were oozing in.

While foreign order volume momentarily is substantially higher than most observers anticipated, of the \$72 million allocated for machine tools under ECA, only about \$26 million has been placed with the fiscal year about half gone. Informed sources are confident, however, that the need for machine tools in Europe is sufficiently acute to bring in the balance. It follows that a good deal of attention is being given to foreign dealer and customer relationships at the present time.

Guarded Optimism Noted

During this month to date, new business has given rise to a guarded optimism in some segments of the industry. Company spokesmen normally inclined to caution are on record with the statement that if orders hold up at the present pace, December will be a good month.

Prospects for next year are promising. As a commentary on the shape of things to come, David C. Elliott, economist for the Cleveland Trust Co., told the Cleveland Chamber of Commerce that next

year will get off to a good start as a result of replacement buying, but the downward trend of plant and equipment expenditures will continue in 1950.

According to Mr. Elliott, many companies have pretty well completed their postwar programs. Some impetus will arise from replacement and further efforts to reduce costs through modernization and purchase of more efficient equipment and possibly greater geographical dispersion of plants. But these developments do not seem likely to offset entirely the declining trend presently in prospect.

Detroit Business Reviewed

In Detroit, a survey of machine tool builders and suppliers indicates that sales volumes have varied over a wide range during 1949. A scattering of firms operated at levels slightly ahead of the previous year's volume. A few of the more fortunate firms have approximately duplicated their dollar performance of a year ago. The majority here, however, has slipped substantially below 1948 with some firms lagging 30 to 35 per cent under the previous year.

Dwindling of foreign business and failure of some auto firms to modernize their plants as quickly as expected has contributed to

this year's deficiency, it is reported. Also, the fact that Detroit tool and die shops, ordinarily substantial buyers of machine tools, have fallen far below their earlier buying schedules has contributed to the shrinking 1949 volume.

Outlook for 1950 Bright

The outlook for 1950 is more promising, according to informed industry sources. It is becoming increasingly evident that a great race in the automatic transmission field has gotten under way. The introduction of the new Chevrolet automatic unit early next year is expected to add further fuel to this competitive fire. Further developments on the present Hydramatics as well as torque converter units are expected during the year. Independent auto producers as well as the Big Three will compete in this race for customer approval.

A little further back of recent transmission developments is the trend toward new high compression engines. Before the year 1950 is concluded or early in 1951 it is expected that Studebaker, Willys and possibly Ford and Chrysler will be on the high compression bandwagon. Among the GM divisions, Buick and Pontiac appear to be considerably advanced in their plans for new powerplants.

Factors for 1951

Coupled with such developments are these additional indications for 1951:

(1) There is a growing realization that modernization of plant tooling is a paying proposition.

(2) The increased activity by small tool and die shops.

(3) The certain knowledge that 1950 tool and die work will be fairly extensive with Ford, GM and Chrysler, in addition to several independents, participating.

In Washington, Jerome A. Raterman, a director and treasurer of National Machine Tool Builders Assn. and president of Monarch Machine Tool Co., Sidney, Ohio, told industrial executives at a Machinery and Allied Products Institute conference on capital goods that business security depends more on new machinery in the plant than on money in the bank.

New Baush 2-Way Horizontal Unit drills, core drills, reams and taps 2 faces of 150 Header Castings, of various sizes, per hour.

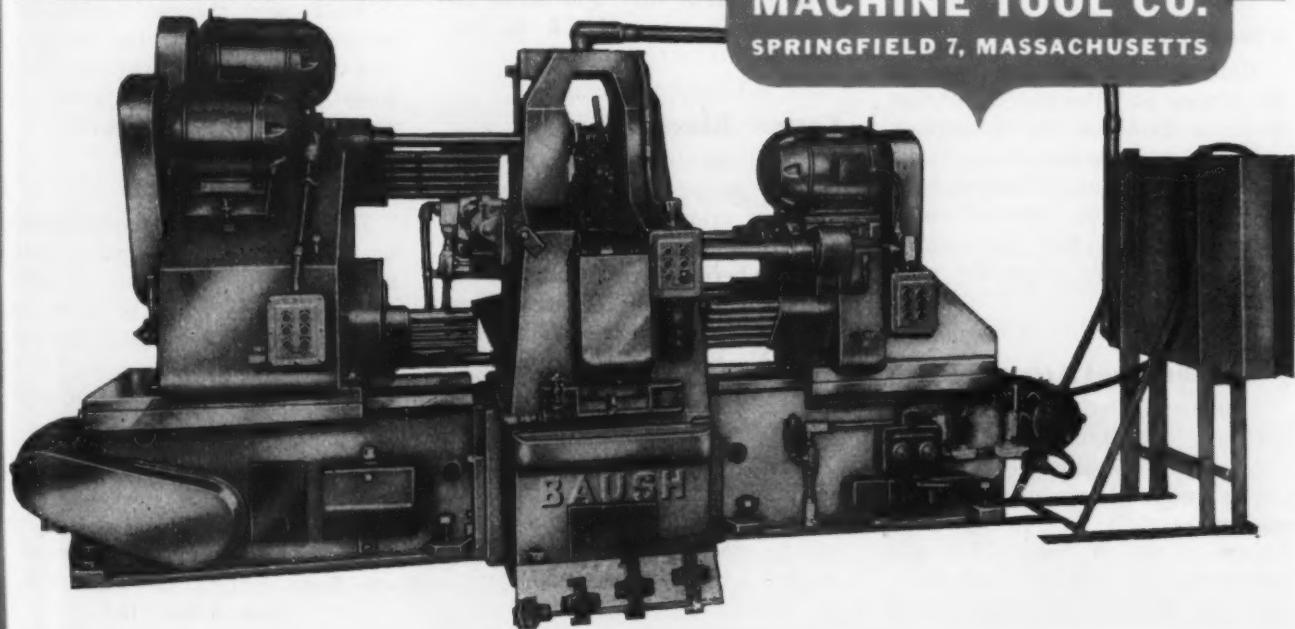
SEQUENCE OF OPERATIONS USING 4-STATION TRUNNION TYPE HYDRAULIC INDEX FIXTURE:

- 1— Load and unload 1 part.
- 2— Left Head: Core drill holes for $\frac{1}{2}$ " pipe thread.
Right Head: Drill Holes for .514" ream.
- 3— Left Head: Idle.
Right Head: Ream .514" diameter holes.
- 4— Left Head: Tap $\frac{1}{2}$ " pipe thread holes.
Right Head: Idle.

Fixture accommodates 4 sizes of header castings. Part is located from the rough contours of casting which is then clamped by hand. When index pin is positioned for final trunnion location, it interlocks with multiple heads to give automatic machining cycle.

Let Baush Engineers solve your production problems. Phone, wire or write us — Better still, send us your blueprints — we know we can help you.

BAUSH
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PUBLICATIONS

Rotary Pumps

Cut-away drawings and specifications in 4-p. catalog describe the six different types of IMO rotary pumps designed to handle residual and distillate fuel oils, crude oils, all grades of lubricating oils, hydraulic oils, viscous fluids, and liquids of similar characteristics. *De Laval Steam Turbine Co.* For more information, check No. 1 on the postcard.

100-Ampere Recloser

Diagrams and pictorial drawings explain the operation of new 100-ampere type GR recloser; also included in this 4-p. folder are the minimum tripping currents for the five coil sizes available. *Westinghouse Electric Corp.* For more information, check No. 2 on the postcard.

Fiberglas Testing

Methods and facilities used in the testing of Fiberglas to provide accurate data on the properties, uses, and performance characteristics are listed and illustrated in 36-p. publication. *Owen-Corning Fiberglas Corp.* For more information, check No. 3 on the postcard.

Machine Tool Attachments

Six-page bulletin presents illustrations, descriptions, and specifications on machine tool attachments such as precision dial and end measuring instruments, two way feed facing heads, full and semi-universal milling attachments, universal tilting and rotary tables,

New publications that describe money saving equipment and services are available free and without obligation. Copies can be obtained by filling in the attached card and mailing it.

plain box tables, spindle to face plate clamps, boring bars, and midget-type openside boring bar supports. *Cincinnati Gilbert Machine Tool Co.* For more information, check No. 4 on the postcard.

Hermetic Seals

Detailed information on the line of hermetic seals and their applications in the manufacture of relays, transformers, condensers, filters, and other components are listed in 16-p. catalog. *Hermetic Seal Products Co.* For more information, check No. 5 on the postcard.

Crane Blocks

Detail drawings, charts, and text in 4-p. pamphlet describe line of Lu-Head crane blocks from 10 to 50-ton capacity for crane operations where extra headroom is needed. *American Hoist & Derrick Co.* For more information, check No. 6 on the postcard.

High Speed Reamers

A new procedure for the making of standard and special high speed reamers where expensive high speed steel cutter blades are secured into a tool body of low cost, low carbon steel by means of a

rolling process is described and illustrated in catalog page. *Halsey Products Co.* For more information, check No. 7 on the postcard.

AN Screws and Nuts

New 24-p. catalog and price list on AN screws and nuts has been designed to sharply reduce product selection time. *Cramer-Krasselt Co.* For more information, check No. 8 on the postcard.

Surfacing Electrodes

Wear - Arc, chrome - boride electrodes for hard surfacing are listed and described in 4-p. catalog. *Alloy Rods Co.* For more information, check No. 9 on the postcard.

Eutectic Products

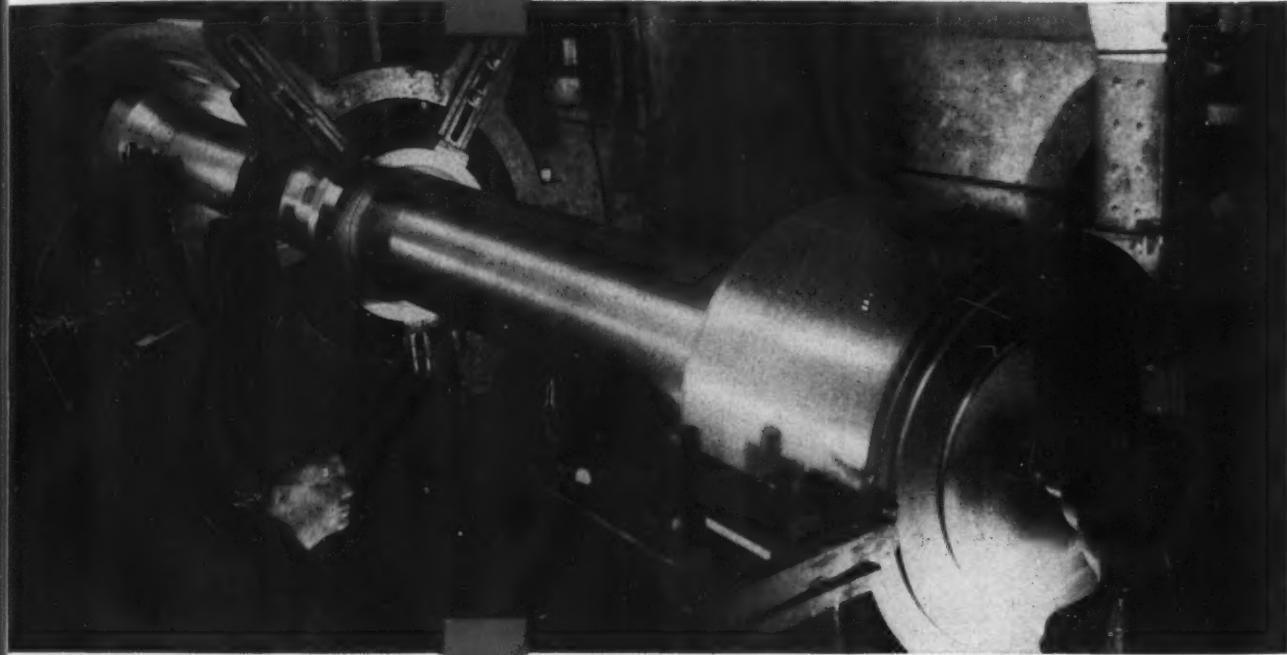
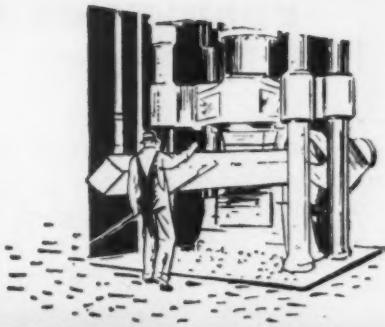
Latest metal-joining information on Eutectic low temperature welding alloys is available in 1950 welding directory that is illustrated with case histories. *Eutectic Welding Alloys Corp.* For more information, check No. 10 on the postcard.

Flame Cutting

Intricate and unusual shapes cut to customer's order by an electric-eye flame cutting method are de-

Turn to Page 167

FORGINGS BY **FINKL**



THIS IS A 46" blooming mill spindle weighing almost 22 tons in the "as forged" condition. It is 24'-10" long and will weigh 18 tons when finished. It was press forged from a 54" ingot weighing 55 tons.

Its highly stressed application in a blooming mill demands strength, stamina, and high fatigue resistance for long life and the utmost in service. Finkl craftsmen build every specification into the job in each stage of its development . . . from research laboratory to finished product.

We invite your inquiry the next time you are confronted with a heavy forging problem. Send your blueprints and specifications for prompt quotations.

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NEW

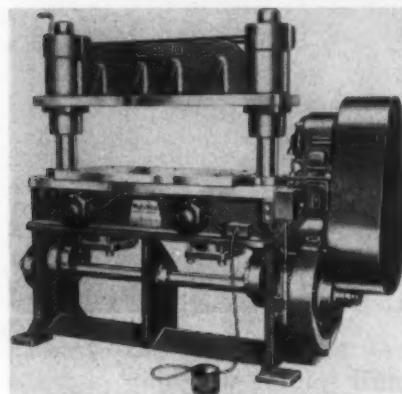
PRODUCTION IDEAS

Continued

ips are available in the 180° Redi-Bends. *Capitol Mfg. & Supply Co.* For more information, check No. 30 on the postcard on p. 35.

Punch Press

A new Multi-Max double crank punch press with bolster area of 16 x 36 in. and ram area of 10 x 36 in. has 30-ton capacity and operates at 80 strokes per min. Standard stroke is 2 in. and max stroke is 4 in. Standard shut die height is 10 in. with 24-in. max, to order. Ram adjustment is 2 in. The press is single herringbone geared, has an electrically operated solenoid clutch, hand operated dual pushbutton



safety switch, and remote control foot switch. *Diamond Machine Tool Co.* For more information, check No. 31 on the postcard on p. 35.

Broaching Accessories

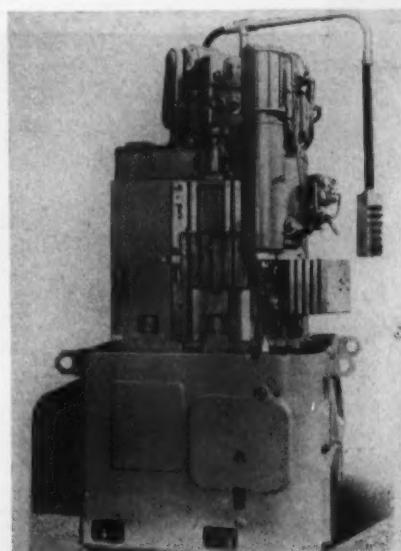
Automatic broach handling equipment for Colonial presses ranging from 4-ton, 24-in. stroke, to 10-ton, 36-in. stroke, provides increased output efficiency, reduced accidental damage to equipment, and protection of machine operator's hands when large, heavy broaches are used. The mechanism consists of an automatic release type puller and a lower receiver. Fixture operation is interlocked with the machine cycle. A separate control permits independent operation of the lower broach handling mechanism for setup. *Colonial Broach Co.* For more information, check No. 32 on the postcard on p. 35.

PRODUCTION IDEAS

Continued

Vertical Lathe

Full advantage of the use of high speed negative-rake cutting tools can be taken on a vertical automatic production lathe designed



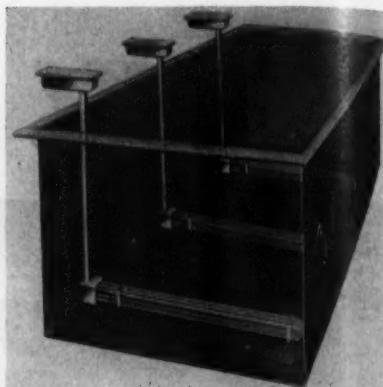
for turning, boring and facing work. The lathe is controlled by a central cycle timer that, after the work has been chucked, starts the spindle, the movement of each slide at its appointed time and, when the work is completed, stops the spindle. Unit construction has been adopted throughout. For setting up the machine, all movements are controlled by pushbuttons located in a pendant panel. *Reed-Prentice Corp.* For more information, check No. 33 on the postcard on p. 35.

Rust-Preventive Cartons

A method for impregnating chipboard and corrugated cartons with the Nox-Rust Vapor Wrapper chemical provides rust-preventive packaging for metal parts, tools and appliances and eliminates the need for temporary rust preventive coatings and inner wrappings to protect the carton from oil or grease staining. An invisible vapor released within the container prevents the formation of rust on metal. Nox-Rust Vapor Wrapper paper in rolls and sheets is also available. *Nox-Rust Chemical Corp.* For more information, check No. 34 on the postcard on p. 35.

Immersion Heater

Portable tank immersion heaters for heating oil and water solutions, tar, paraffin, solvent cleaners and similar compounds are available



with copper, steel Inconel, or stainless steel sheaths, depending upon the corrosive properties of the solution to be heated. Heating elements at the bottom of the vertical riser range from 12½ to 53 in. long in straight sections, or circular shape with a minimum opening of 10½ in. The heated section has 2 or 3 hairpin elements. A gasketed, liquid-tight terminal box, with heat and acid-resistant coating is mounted atop the riser for rigid-conduit line connections. *Edwin L. Wiegand Co.* For more information, check No. 35 on the postcard on p. 35.

Air Filter Doors

An overhead all-metal Rol-Top door for paint-spray rooms and work areas where air is subjected



to high spray or powder content features rows of standard, furnace-type, spun-glass filters in each panel, permitting a continuous supply of clean, fresh air to circulate into the room, even when the door is closed. At the same time air escaping from the room through

Turn to Page 169

the trend is

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FENDERS • BODY PANELS • DECK LIDS
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December 15, 1949

On the ASSEMBLY LINE

AUTOMOTIVE NEWS AND OPINIONS

Production of cars and trucks hits a new all-time high of 6,200,000 vehicles . . . No-sag springs offer important cost savings to producers . . . Harvester introduces new trucks.



by

Walter G. Patten

Detroit—Your Detroit correspondent has the doubtful distinction of having sold the automobile industry short by more than a million cars and trucks in 1949.

Gives Reason for Low Estimate

Each year in late December the Automobile Manufacturers Assn. holds a contest in which members of the Detroit Press Section attempt to estimate the number of vehicles that will be built during the coming 12 months. The guess we made a year ago was 5,050,000. It now appears that the 1949 total production will reach an all-time high of 6,200,000 units.

Like a lot of other people, we deliberately set back our estimate

of last December because it seemed that the market simply wouldn't absorb 6 million cars and trucks.

Incidentally, the three lowest guesses in the contest were submitted by correspondents who are closely associated with the steel industry. "Maybe your steel friends are too bearish," a friend suggested.

In contrast to the steel industry, the automobile industry is perennially "bullish" about its prospects. Auto executives frankly admit this. Since the war, however, the industry has been more accurate in its market forecasts than any other industry. C. E. Wilson, president of General Motors, has hit the market target every time. One thing we have learned is to pay respectful attention to Mr. Wilson's market estimates.

Record Production Goals Set

The industry is going to be wrong sometime. It could be 1950. At the moment, GM has set its production goals for the year at the highest level in history. Other car producers are expected to follow this lead almost without exception. If the industry is right again, 1950 ought to be another good year.

While domestic sales are holding at unprecedented levels, the export market for cars and trucks is dwindling fast. AMA estimates that less than 300,000 vehicles will be exported this year. This compares with 436,217 units shipped abroad in 1948 and 733,762 units exported in 1929.

Wholesale Value Tops '48

AMA estimates the wholesale value of this year's automobile production will reach a whopping \$8 billion or about \$1.3 billion more than the 1948 total. Replacement parts volume is expected to drop about \$500 million from last year's record-breaking wholesale total of \$2½ billion.

Average employment in the automobile industry is now 780,000. The industry's 650,000 production employees are expected to earn about \$2.3 billion in wages which is equivalent to 29¢ for every dollar of new vehicle sales.

One of the biggest statistics about the automobile industry will probably draw little attention. Here it is: The tax bill for motor vehicle owners will be just about half as much as the public will spend on new cars or \$3.7 billion. This compares with \$3.4 billion in special taxes in 1948, \$2.1 billion in 1941 and \$849 million in

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* * *

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tool experts.

You'll find it will pay to head this way for
better reamer results. Run comparative tests
and note the savings effected.



(A) "Blue Helix" Chucking Reamer—Straight Shank
(B) "Blue Helix" Chucking Reamer — Morse Taper
Shank (C) Stub Screw Machine Reamers (D) Camlock
Adjustable Shell Reamer (E) Taper Shank Jobber's
Reamer (F) Hand Reamer (G) Helical Taper Pin Reamer
(H) Shell Reamer (I) Precision End Mill Reamer for Jig
Borer (J) Camlock Adjustable Chucking Reamer
(K) Duplex Spiral Locomotive Taper Reamer.

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It Pays to Buy REAMERS on a Performance Basis

REAMERS



NEW LINE: The new L-line of International Harvester trucks was introduced throughout the country recently. The new line features a completely new design in motor trucks which is at once apparent from the massive front end to the smartly styled cab. The new cab has been designed for convenience. Chassis dimensions have been engineered to provide better load distribution and maneuverability. Many improvements have been incorporated into the truck engines.

1929. If all of the taxes, direct and indirect, were included, the figure would be much higher.

No-Sag Seat Spring Offers Cost Savings to Auto Producers

The no-sag seat spring is a recent development of the automobile industry that has received little attention. However, from the standpoint of wire suppliers, car designers and public carriers this development has important implications.

Ford and General Motors have now eliminated coil springs from the front seat of most of their cars. The new Ford Z-type construction consists of a single plane of stiff wire with a reverse bend that is strong enough to resist sagging even after many hours of driving. The wire is double thickness from about one-third of the way back from the front of the cushion. The same type spring is employed for the back of the front seat.

Springs' Advantages Cited

Where the Z-type construction is used, the spring is covered with cotton padding. Over this is laid a $1\frac{1}{4}$ in. pad of foam rubber. A soft cotton pad is placed between the foam rubber and the upholstery.

The new type springs are supplied to Ford by Murray Corp., American Metal Products Co. and Falls Spring & Wire Co.

A substantial advantage of the

new springs from the standpoint of the car owner is greatly improved riding comfort and virtual elimination of seat sag. Another advantage is the additional foot room provided under the front seat.

From the standpoint of auto producers, there are numerous advantages in favor of no-sag springs. Construction of seats is simpler. Also, front seats are designed so that the tendency of the back of the seat to open up is practically eliminated.

Because the new springs can be shipped flat to assembly plants all over the country there is a very substantial savings in shipping costs. The new springs occupy only about 70 per cent as much shipping space as the earlier design. Weight of the new type spring assembly is 12.5 lb, less than the coil assembly.

Expects Springs Adoption

Because of their construction and obvious advantages from the standpoint of both the car owner and manufacturer, it is expected that no-sag springs will be adopted by most car producers within a year or two. Automobile engineers also predict that some variation of this design will eventually be used in the rear seat of passenger cars. Such a change will probably bring with it a widespread adoption of the Ford policy of offering foam rubber front seats at no extra cost.

International Harvester Introduces Its L-Line of Trucks

It has cost International Harvester \$30 million and more than 3 million miles of driving under proving ground and actual road conditions to develop its new L-line of trucks embodying 87 truck chassis models. The new models feature "Comfo-Vision" cabs, a completely re-engineered chassis, shorter overall lengths and improved engine accessibility. Many of the mechanical changes are designed primarily to reduce operating costs.

The new all-metal cab provides the ultimate in roominess and driver comfort. The new cab measures $58\frac{1}{4}$ in. wide by $51\frac{1}{4}$ in. high. Full width seats are built as a unit and ample seat and back adjustments are provided for the driver. The instrument panel closely resembles that panel in the latest model passenger cars. Seats are covered with a plasticized-treated surface.

The new Harvester truck windshield is one-piece, providing maximum visibility. Glass area has been increased to 12.6 sq ft.

Increased Payload Claimed

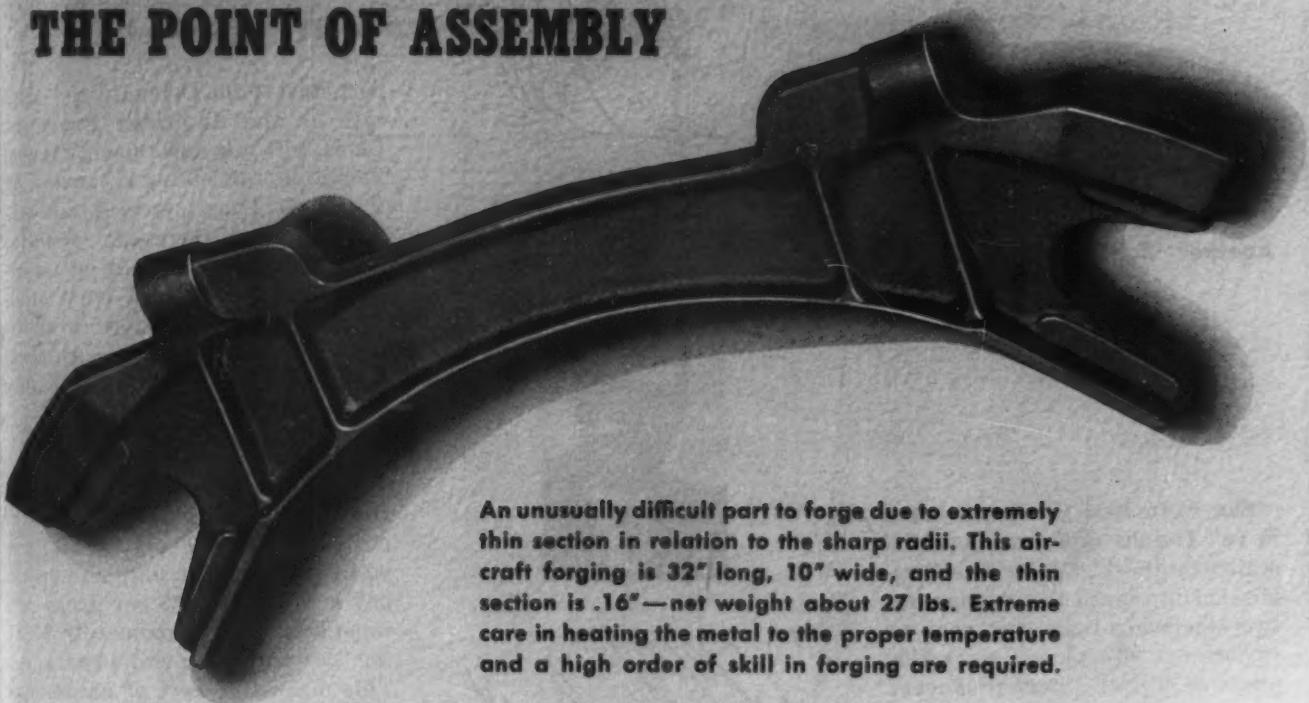
Harvester engineers have provided increased maneuverability by shortening the wheelbase as much as 7 in. in some models. Better load distribution and an increase in payload is claimed for the new design.

Among the engine features are larger bearings, heavier crankshaft, connecting rods with a bigger bearing area, aluminum alloy, four-ring pistons, heat-treated exhaust valve inserts, oversize oil bath cleaner and an induction-hardened crankshaft.

The new L-line has wider and sturdier axles engineered to specific job requirements. The new frame uses five crossmembers in light trucks, six in mediums and seven in heavy duty jobs. All crossmembers are cold-riveted to the channel siderails. The channel-type bumper is mounted directly to the frame to provide added strength and rigidity.

TRANSUE FORGINGS

**USUALLY COST LESS AT
THE POINT OF ASSEMBLY**



An unusually difficult part to forge due to extremely thin section in relation to the sharp radii. This aircraft forging is 32" long, 10" wide, and the thin section is .16"—net weight about 27 lbs. Extreme care in heating the metal to the proper temperature and a high order of skill in forging are required.

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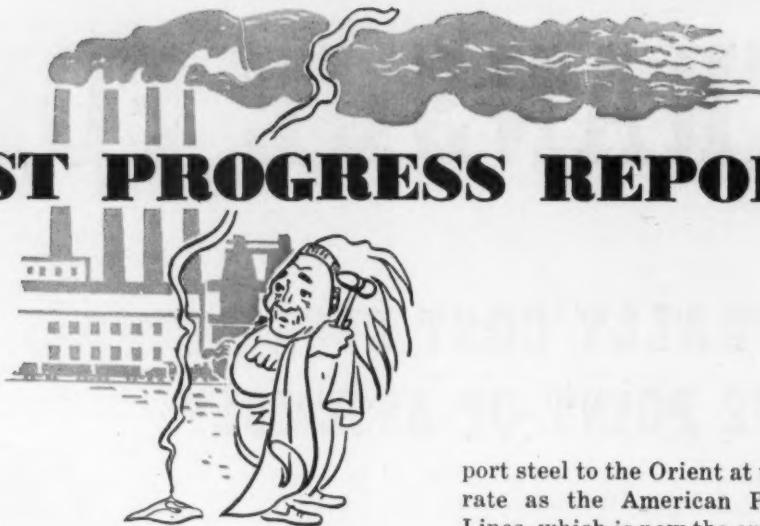
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OVER 50 YEARS OF FORGING PRODUCTION EXPERIENCE

WEST COAST PROGRESS REPORT



**Effect of reduced rail rates and potential subsidies for trans-Pacific lines being studied . . .
Another light car announced.**

San Francisco—Recent changes in rail freight rates and potential action by the U. S. Maritime Commission in regard to subsidies for two steamship lines may have an important effect on marketing plans of western steel producers.

Lower rates from producers in southern and central California on shipments in the classification of general iron and steel, including pipe, in minimum 80,000 lb carloads place California producers in a more favorable position with Geneva Steel Co. and those who reach the Northwest by water.

Geneva Shipping Rates Lower

For example Kaiser, Bethlehem Pacific and Columbia can ship from southern California plants to Portland for \$13.40 per ton, a reduction of \$4.40; to Seattle for \$14.80, a reduction of \$4.20; and to Spokane for \$15.40; a reduction of \$10.80. These rates do not include the 3 pct tax.

Geneva can ship into the Portland area for \$12.60 per ton; to Seattle for \$14.00 and to Spokane for \$12.60. Thus it will be noted

Digest of Far West Industrial Activity



by

that Geneva has only an 80¢ per ton advantage into Portland and Seattle and a \$2.80 per ton advantage to Spokane markets.

Producers in the San Francisco Bay Area will enjoy approximately a \$2.00 per ton freight advantage over southern California producers into these markets.

Western steel producers were also watching and taking part in the hearings held last week before the United States Maritime Commission here during which Pacific Far East Lines, Inc. and Pacific Transport Lines, Inc. sought to convince the commission that they were entitled to operating subsidies. While these lines now trans-

port steel to the Orient at the same rate as the American President Lines, which is now the only trans-Pacific line receiving a subsidy on the West Coast, steel producers believe that in the event subsidies are granted they would be amenable to lower rates at least sufficiently below those now in effect to off-set the West Coast dock charges which are not applicable in the East.

Army Rates Are Lower

At present steel can be shipped from the East Coast to Oriental ports for \$26.50 per gross ton while West Coast shippers must pay a rate of \$25.25 per gross ton in addition to approximately \$1.21 for "car unloading and wharfage." This makes the cost of shipments from the West Coast to the Orient approximately the same as those brought from Atlantic ports through the Panama Canal and on about 10,500 miles to the Orient.

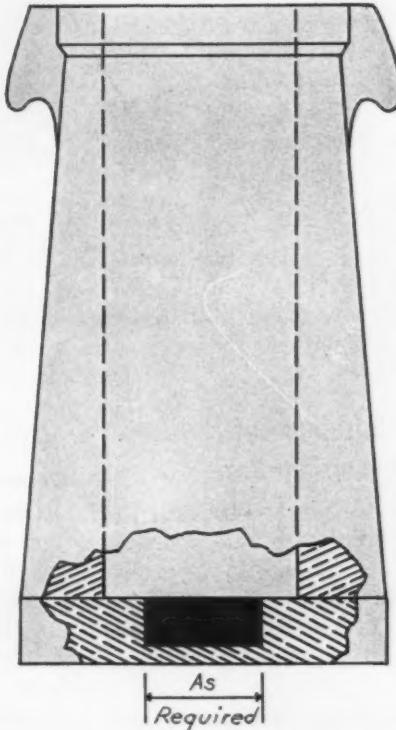
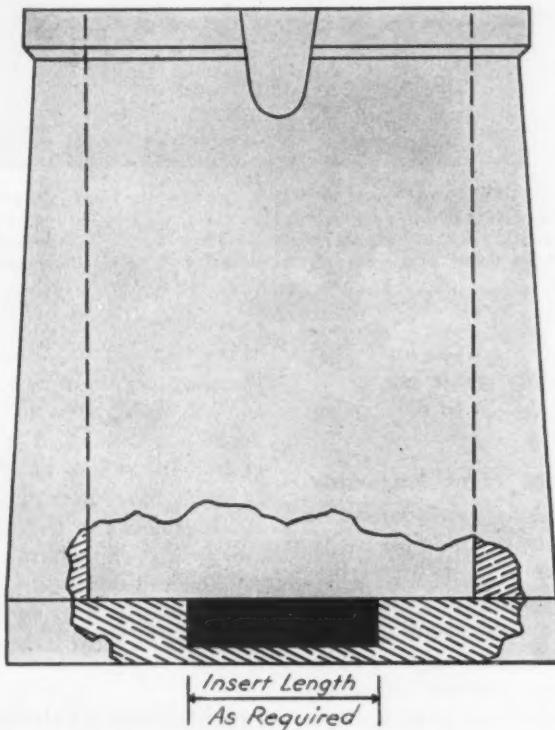
Interested In Lower Rates

Western producers point out that it is certainly logical that rates from this coast to the Orient should be considerably less than from the East Coast because of the shorter haul and they are quick to point out that the United States government itself insists on lower rates for Army shipments which are approximately \$6.56 less from this coast than from the East Coast, to the Orient. There is approximately \$4.50 gross ton difference between shipments made between the East Coast points and West Coast points to Hawaii for Army materiel.

It is also interesting to note

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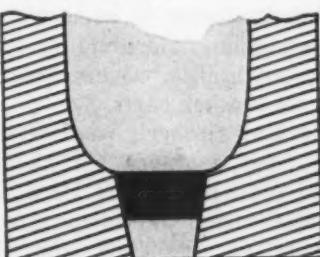
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that when a West Coast steel producer attempts to reach a European market he finds that he must pay from \$12.50 to \$15.00 per ton more than an Atlantic shipper depending upon the type of steel and the port to be reached.

At the Maritime Commission hearing C. M. Denton, president of Pacific Iron & Steel Exporting Co. of Los Angeles stated that three trips to the Orient this year have convinced him that this territory offers a wide and rich market for producers who need reduced rates in order to maintain a competitive position against East Coast producers and foreign producers.

Hubert D. Long, another exporter of steel and other commodities in Los Angeles, concurred with Mr. Denton's comments and expressed the belief that subsidies to the two applicants would eventually mean rate reductions, more frequent sailings and expanded markets for western steel producers.

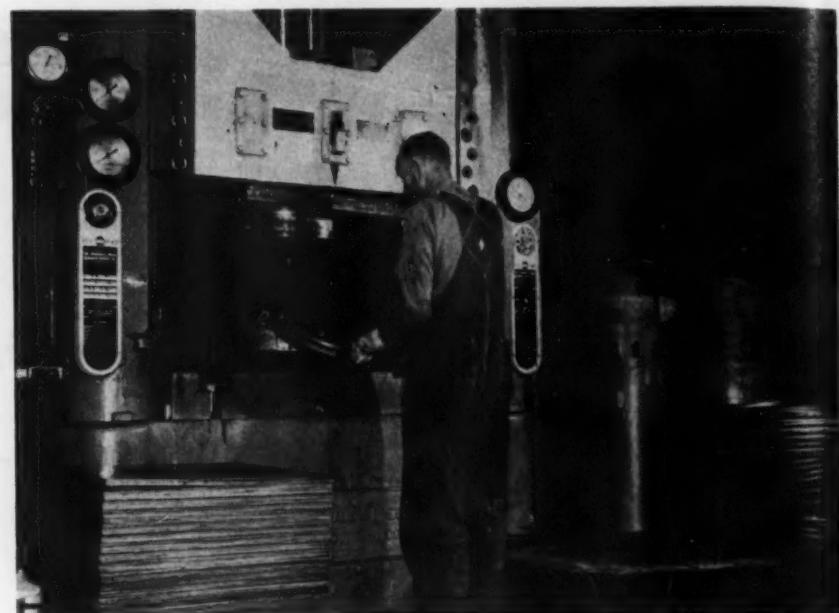
Discloses Development Of New Lightweight Car

San Diego—Another hopeful in the "commuter" auto field appears as the T. P. Hall Engineering Corp. of San Diego discloses development of a lightweight car with a 10-hp air-cooled aluminum engine.

Other southern California manufacturers have announced lightweight cars in the past 2 years and produced display models, but none have been able to go into production.

The newest car, known as the "Airway" has been engineered so that it can be manufactured or assembled by several licensed firms in the United States and other countries, according to Mr. Hall. Expensive tooling has been cut down with a design allowing only a minimum of compound curvature in the body.

Weighing 775 lb, the car has its power unit mounted in the rear and claims 45 miles to a gal and a maximum speed of 45 mph. It is close in size to a standard car,



TRANSFORMER COVER: At General Electric's transformer plant in Oakland, Calif., a punch press operator places a lightly oiled steel sheet in this 300 ton hydraulic press which blanks and draws the covers for the transformer tanks. In addition to covers, a variety of other drawn parts such as tank bases and pockets are produced in this press.

however, being 158 in. long and 58 in. wide. Mr. Hall claims it will sell in the \$500 to \$686 price range.

Constructed of Light Materials

Constructed of aluminum alloy and plastic materials mainly, it has fluid drive. The main structures are of aluminum alloy with plastic in the body sections. It will seat three. It has a simple fluid coupling instead of the standard mechanical clutch, and the transmission is geared to a chain.

Standard equipment, manufactured for other cars and therefore easily available is used for the transmission, fluid coupling, steering gear, brakes, wheels, bearings and some other parts.

Mr. Hall formerly was chief development engineer for Consolidated Vultee Aircraft Corp. and handled initial development engineering on the B-36 and B-24 bombers, the Navy's PB4Y-2 and PBY. Many aircraft design features and the use of aluminum reflect this background. One of the craft he perfected was the Hall flying automobile which was actually flown. One crashed about

a year ago after it had become a familiar sight in the San Diego section, both as a somewhat conventional auto and a flying machine. It cruised at 130 mph and carried four persons. It had a 190 hp engine in the flight section and a 26½ hp engine in the car for ground operation. The flight section could be removed quickly upon landing for driving in town.

Lockheed-Union Relationship Cited

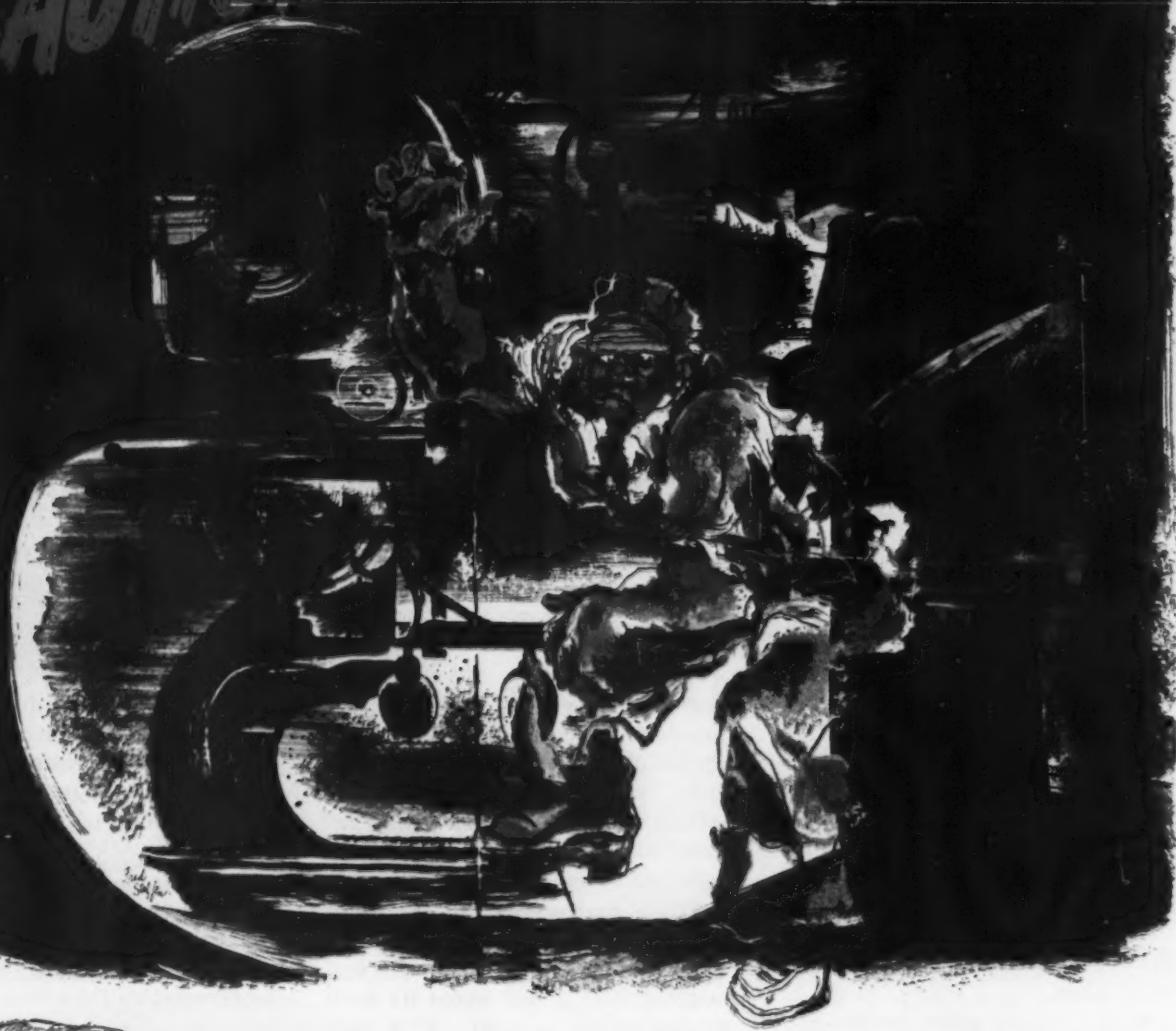
Los Angeles—The peaceful relationship between Lockheed Aircraft and the National Assn. of Machinists, an unaffiliated union, has been cited as an outstanding example of the possibilities of understanding between labor and management by the National Planning Assn. in Washington.

Despite strikes in other airframe plants, Lockheed has kept its men working for 12 years without a break.

There have been 30,000 grievances, 25 arbitrations, frequent use of the old War Labor Board and Federal Conciliation service, two near strikes and one actual strike vote, but no walkouts.

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You can save $3\frac{1}{4}$ man hours for every 100 lbs. of grease and eliminate contamination risks, too.

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There is a way you can save up to 23.9 man hours in the application of every 100 lbs. of grease!

Have you ever measured your losses from "downtime" on machines due to bearing failure caused by faulty lubrication? Or have you ever figured the cost of "time-out" for lubrication? More thievery!

You can lubricate hundreds of bearings from one central point, with the right grease in the correct amount—while the machine continues to produce.

Have you got a clue that there may be a production thief in your plant—masked as faulty, old-time, hit-or-miss lubrication methods?

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THE FEDERAL VIEW

THIS WEEK IN WASHINGTON

U. S. reiterates its anti-cartel policy . . . Congress faced with tax legislation which would permit accelerated depreciation . . . Transportation gripes to be aired.

by

Eugene J. Hardy



Washington—The Dept. of State and the Economic Cooperation Administration are beginning to deliver smashing blows to cartel-minded western Europeans. The State Dept.'s recent official announcement was nothing more than a very simple statement reiterating the anti-cartel policy of the United States, but significant steps have been taken.

United States policy toward cartels has been stumbling along since the end of the war, largely because of lack of unanimity within the various agencies concerned with the problem. However, even more important is the fact that when some agreement on policy was reached, it was generally frustrated by the British and French governments.

Insists on Legislative Measures

One of the most important steps taken recently was the insistence on the part of High Commissioner to Germany, John McCloy, that the west German government enact legislation to carry out the cartel recommendations of the three Allied High Commissioners.

Of more immediate and practical effect, however, is ECA's battle to

end one of the more important adjuncts to the cartel system; that is the policy followed by Britain, Germany, and the Benelux nations of setting export prices for basic raw materials higher than those charged domestic users.

ECA's first success in the campaign was reached only 2 weeks ago when the Belgian government announced that it had ended its dual pricing policy on steel. ECA will continue to push for abolition of this practice and reportedly will even go so far as to reduce Marshall Plan dollar allocations to countries charging higher prices in the export market and increase the allocation to the overcharged country by a similar amount. There is little doubt that such a move would quickly bring the offending countries into line.

Depreciation-Allowance Tax Bill Slated for Congress

With the commencement of a new session of Congress only a couple of weeks off, new and increasing pressure is being put on members of both houses for tax

legislation which would permit accelerated depreciation rates on machinery and equipment.

Members of both parties agree that action on the problem of today's unrealistic depreciation rates is long overdue. But bills designed to correct the situation failed to get to first base in 1949, principally because the unbending refusal of Representative Doughton, D., N.C., chairman of the House Ways and Means Committee, to consider the subject.

Lack of Investment Capital

The case for short-term amortization was brought up on Capitol Hill again last week in hearings before a Joint Economic Subcommittee looking into the reasons for the present lack of investment capital. The subcommittee is headed by Senator O'Mahoney, D., Wyo.

"What steps should the government take to preserve an open door for the investment of savings in little and local business?" Senator O'Mahoney wants to know. The answers were supplied in several thousand well-chosen words by the Small Business Advisory Committee of the Commerce Dept.



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Recommendations for correction of present depreciation laws were brought out in subcommittee hearings last week by Ross Stewart, automobile equipment wholesaler, of Houston, and a member of the advisory committee.

Accelerated depreciation will contribute more toward increased production than any other tax device, Mr. Stewart told the investigating group. And, he pointed out, the greater the nation's production, the greater the tax revenue for the operation of government.

Outlines Law's Benefits

In addition to the immediate benefits of expanded productive capacity, he said that passage of an accelerated depreciation law would mean:

- (1) Added revenue for the government.
- (2) Greater opportunity for small business.
- (3) Increased employment.
- (4) Stabilization of inflationary tendencies.
- (5) Better chances for small business to finance itself.

(6) Greater product output so that the U. S. could compete in world markets without tariff.

While no member of Congress can yet predict just what kind of a depreciation-allowance tax bill may be passed by the second session of the 81st Congress, there is every reason to believe that some sort of tax relief in this field will be granted. It's up to businessmen to present a convincing case to Congress in 1950.

many Congresses without any effective remedies being developed.

Basically the objective of the committee is to determine whether national policy as outlined in the Transportation Act of 1940 is sufficiently flexible and broad to meet the changing conditions in this field, particularly those that have arisen since the end of World War II. Many transportation agencies as well as shippers claim that the act needs a basic overhauling, and point to ever-pyramiding costs of transportation and shifts in methods to back up their claim.

Will Investigate Freight Rates

Admittedly, one of the biggest problems Congress will tackle in an election year, the subcommittee headed by Senator Myers, D., Pa., wants to hear from transportation industries, trade associations, shippers, and government agencies. The questions which the committee would like to have answered are many and varied.

On the subject of higher freight rates, the committee would like to know the extent such rates are reflected in the cost of goods and services, and further how increased rates can be justified while the railroads are steadily losing traffic. Absorption of passenger losses by means of higher freight rates is also of great concern. In other words, the committee is searching for a true picture of the effects of transportation rates on industry generally.

Tax Policies To Be Studied

Another subject which is rapidly coming to the forefront in many investigations is that of Federal Tax policies. The committee would like to determine what effect present tax laws have on investment in the transportation industry. The expenditure of large sums of public funds for the development of differing methods of transportation will also occupy a prominent place in the investigation. A complete picture of the revenue, expenses, taxes, investments, and rate of return for each type of carrier will also be developed during the course of the hearings.

THE BULL OF THE WOODS

By J. R. Williams



A practical evaluation of

Ductile Cast Iron



By T. E. EAGAN

Chief Metallurgist
and

J. D. JAMES
Foundry Superintendent
Cooper-Bessemer Corp.,
Grove City, Pa.



IT has been reported⁸ that the unnotched endurance limit of the as cast, and annealed ductile iron to be between 44 and 49 pct of the tensile strength. They do not mention the section size of the bars used for the tests. This is the only information available on the endurance limit of ductile iron.

Several endurance tests have been made by the authors from test specimens machined from actual castings which will be reported later.

However, as no notch endurance tests have been reported, the authors wish to report one.

Two cylinders, 8 in. OD by 4 1/4 in. ID by 18 in. long, were cast and heat treated to obtain as much ductility as possible. These cylinders were cut to obtain sufficient specimens to run a standard and a notched endurance test. The tests were run on a rotating beam endurance testing machine. The diameter of the test specimens was 1 in. and the notch used was 0.050 in. radius (see

SUMMARY: First published data on notch endurance characteristics of ductile iron are presented in this second part of a two-part article covering an extensive, practical examination of the potentialities of this material. The authors also describe a series of bursting and endurance tests on full size pressure vessels and also discuss properties of a conveyor part cast in ductile iron and other ferrous metals.

Ductile Cast Iron*Continued*

fig. 4).

The results obtained are shown in table VII in which is incorporated similar tests for forged steel, an alloyed gray iron and ductile iron. All the tensile tests reported were cut from the same piece as the endurance test specimens. It will be noted that the ratio of endurance limit found in this case was lower than reported previously. However, it has always been our experience that this is so when heavy sections are used instead of specially made test bars.

The effect of the 0.050 in. notch is extremely interesting. The reduction of endurance limit due to this notch was 49 pct for forged steel, which may be considered normal. The reduction for a rather highly alloyed gray iron was 18.8 pct, which is the same value as that recorded for ductile cast iron. It can, then, be tentatively concluded that ductile cast iron has about the same notch sensitivity as high test gray iron. However, many more tests using various sizes of notches are necessary to give conclusive proof to this statement.

Before adopting any new material for use as component parts of engines and compressors, it is always necessary to conduct extensive tests, at first in the laboratory and then in field service. This always takes a considerable length of time and is very expensive. To destroy large castings

² Gagnebin, Millis and Pilling, "Ductile Cast Iron," THE IRON AGE, Feb. 17, 1949.

In the first part of this two-part article, the authors discussed foundry practice, mass effect, heat treatment and impact strength.—Ed.

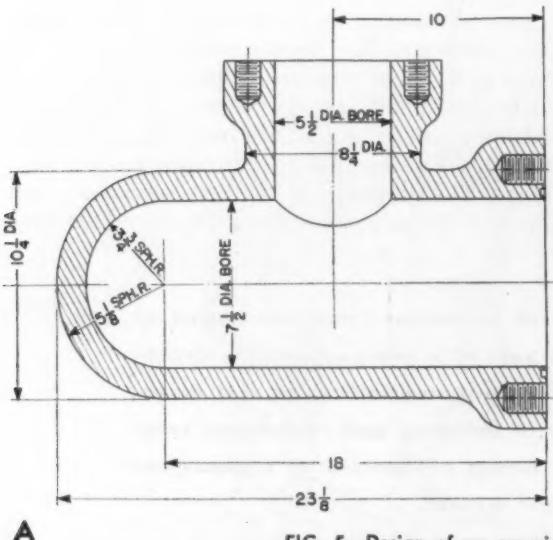
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FIG. 5—Design of an experimental pressure vessel is shown at A. The casting prepared for bursting tests is shown at B.

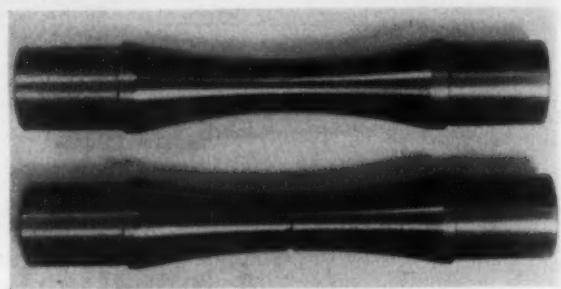


FIG 4—Fatigue specimens used for notch effect test. Notch is 0.050 in. radius.

in order to find the physical properties and condition of the metal in the castings is certainly to be avoided if possible.

The physical properties of the metal, as determined with laboratory test specimens removed from the casting, are usually interesting to a design engineer. He, however, is much more concerned with the structural durability and strength of the casting as a whole. He wishes to know the effect of design along with the strength of the material. Strain testing using the SR4 strain gages has been very helpful in this respect. However, structural durability under dynamic loading cannot always be forecast with desirable precision through the use of SR4 strain gages alone.

In order to compare static and dynamic properties of selected materials for pump and compressor service, a test pressure vessel of economical size, shown in fig. 5, was designed. The flanges of the vessel are studded, and the familiar stress concentrations encountered when one bored hole intersects another have been incorporated. Vessels were made of a Class 40 gray iron, a Class 60 acicular gray iron, ductile cast iron, and cast steel ASTM Specification A 27 grade 65-30.

A sufficient number of vessels to conduct the

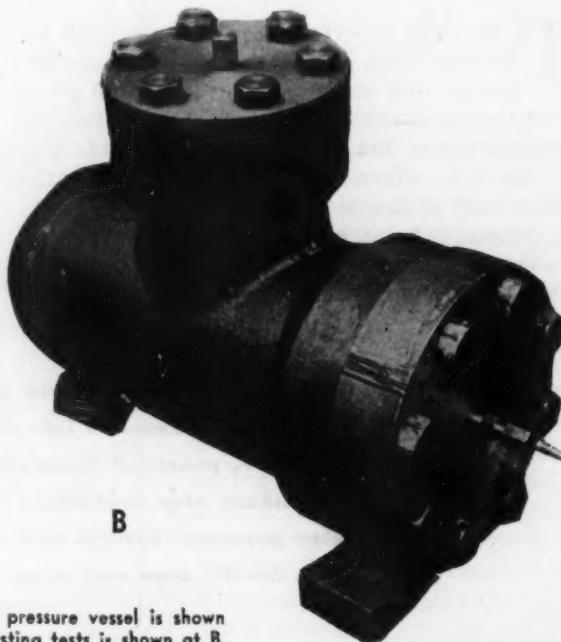


TABLE VII

Summary of Notched and Unnotched Endurance Limit—0.050 in. Notch.

Material	Tensile Properties					Endurance Limit				
	T. S., psi	Yield Point, psi	Elong., psi	Red. of A, pct	Hardness, Bhn	Unnotched, psi	Notched, psi	Ratio EL/TS, Unnotched	Ratio EL/TS, Notched	% Red. of EL Due to Notch
Forged Steel.....	80,100	44,600	24.5	32.7	.....	35,000	17,800	0.44	0.22	49.0
M-50 Mechanite.....	48,800	.....	.....	.....	216	18,000	13,000	0.34	0.265	18.8
Ductile Cast Iron.....	71,500	51,200	8	.....	170	24,000	18,500	0.34	0.26	18.8

Material	Chemical Analysis									Heat Treatment
	C	Si	Mn	P	S	Ni	Cr	Mo	Mg	
Forged Steel.....	0.42	0.31	0.70	0.055	0.037	.....	.....	.....	.....	Quenched and tempered
M-50 Mechanite.....	2.88	1.38	0.96	0.078	0.064	1.55	0.37	0.53	.....	As cast
Ductile Cast Iron.....	3.48	2.15	0.51	0.12	0.008	1.78	.....	.....	0.08	Annealed

tests were cast from one ladle of each metal. One of these castings was also sectioned through the critical areas and examined for soundness. This same casting was also used for the standard laboratory tests.

One vessel of each type of material was burst hydraulically using a special high pressure pump and an accurately calibrated pressure gage. One of these cylinders ready for this pressure test is shown in fig. 5.



FIG. 6—Compressor head, weighing 2200 lb, used for bursting tests.

TABLE VIII

Physical Properties of Pressure Vessels, in Various Materials

	Class 40 Gray Iron	Special Alloy Gray Iron	Cast Steel	Ductile Cast Iron
Tensile strength, psi.....	44,700	71,900	72,200	67,400
Yield strength, psi.....	.....	.....	45,600	52,500
0.2% offset.....	1	1	20.5	6.0
Elongation, pct.....	2	2	25.1	4.7
Red. of area, pct.....	2	2	25.1	180
Hardness, Bhn.....	180	254	141	.....
Impact, ft-lb.....	173	283	284	3 blows
Endurance limit, psi.....	16,000	24,500	26,000	21,500
Bursting Pressure, psi.....	7,200	8,250	16,200 ³	14,750

¹ The yield strength was not determined. ² There is no appreciable amount of elongation or reduction of area in gray cast iron. ³ Unnotched 0.798 in. diam. bar. ⁴ Standard 0.3 in. diam. notched bar.

⁵ Steel vessel did not burst but distorted beyond ability to seal the pressure.

The results of this test are given in table VIII. The physical properties shown are from test bars machined from the center section of the casting itself and not from separately cast test pieces. The physical properties obtained in the ductile cast iron vessels was disappointing because it was expected that it would be possible to do better. The test, however, was well on its way before the error was discovered. The test data, however, are reported as a comparison, with reservations that subsequent tests on the ductile cast iron may show better results.

It will be noted that in the Class 40 gray iron, with an actual tensile strength of 44,700 psi, the

bursting pressure was 7200 psi. An alloyed acicular iron with a tensile strength of 71,900 psi, which is almost equal to that obtained in the cast steel vessels, had a bursting pressure of 8250 psi. Thus, these two types of materials, which have little or no ductility, do not have the bursting strengths which might have been expected from the tensile strength of the material.

On the other hand, the ductile cast iron vessel, with a tensile strength of 67,400 psi, had a bursting pressure of 14,750 psi; and the cast steel vessel with a tensile strength of 72,200 psi had a bursting pressure of 16,200 psi. It, therefore, appears that material with an appreciable amount of ductility will withstand higher static loading than those with little or no ductility.

These vessels are now being subjected to pulsating hydraulic loading using a hydraulic fatigue testing machine developed by Cooper-Bessemer which is capable of giving pulsating pressures from atmosphere to a predetermined pressure at the rate of 550 impulses per min. These tests are not completed but up to the present time it has been found that the vessels have exhibited the following endurance limit: Class 40 gray iron, below 0 to 1500 psi; Class 60 special alloy iron, above 0 to 2000 and below 0 to 2500 psi; Ductile cast iron, above 0 to 3000 psi and below 0 to 3500 psi; Cast steel, above 0 to 3000 psi.

The cast steel vessel is running at 0 to 3500 psi at this time.

Tests on a Compressor Head

In order to determine the possibility of casting ductile iron in compressor parts, the compressor head shown in fig. 6 was chosen as being a rather ideal example. This is a large casting weighing 2200 lb. The diameter of the face is 30½ in., and the part is 26¾ in. tall. There is no way to photograph this piece to show the intricacy of the pattern. The thickness of most sections is 1¼ in.

This particular head was selected because four different steel foundries have painfully and expensively demonstrated that it is practically uncastable in steel.

The head was cast in ductile cast iron. It was heat treated as follows: 1700°F—5 hr, cool in furnace to 1275°F, hold for 20 hr, cool in air.

The physical properties obtained from 1-in. keel blocks cast of the same metal and heat treated with the casting gave the following results: Tensile, 72,500 psi; yield point, 59,000 psi; elongation, 17.0 pct; Brinell hardness, 170; Izod impact strength 0.798 unnotched bar, not broken first blow—broke on second blow with 55 ft lb.

After heat-treating, the head was completely machined and hydraulically tested at 50 psi for leaks. It passed this test without repairing.

The head was then tested to destruction using the hydraulic equipment mentioned previously. It burst at 3950 psi. At the time of bursting, it stripped the nuts from the studs holding the caps over the discharge ports. Thus we feel that the piece was as strong as the component parts in the design.

The wide difference in bursting pressures of the experimental pressure vessels cited earlier and the actual compressor head given here is, of course, a matter of design. The authors have no comparative information on a cast steel compressor head of the same design.

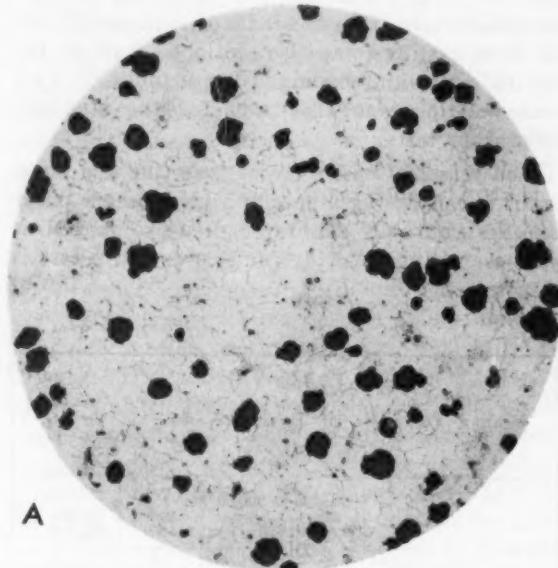
After bursting, tensile test and endurance

limit samples were taken from the casting with the following results: Tensile, 60,400 psi; yield point, 52,900 psi; elongation, 5 pct; Brinell, 167.

The endurance limit was 24,500 psi or a ratio of endurance limit to tensile strength of 0.406.

The explanation of the difference in the physical properties between the 1-in. keel block and the casting itself is that the keel block had its graphite completely in the spheroidal form and the casting had a considerable amount of flake graphite in it due to too low a magnesium content for the size of the casting, as shown in fig. 7.

Many small castings have been made of ductile cast iron with complete success. Variations in analysis apparently do not cause wide variations in the physical properties obtained or in the heat-treatment required. The testing of these smaller castings has consisted in cutting test



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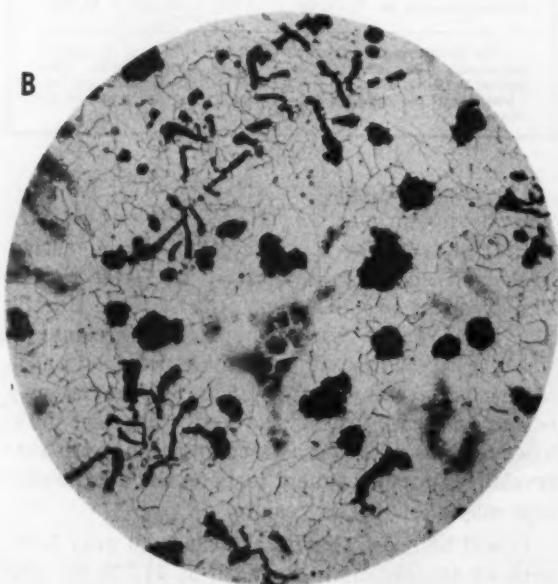


FIG. 7—A comparison of microstructure, from the same heat, in (A) a 1-in. keel block and (B) in the casting itself. 100X, 5 pct Nital etch.

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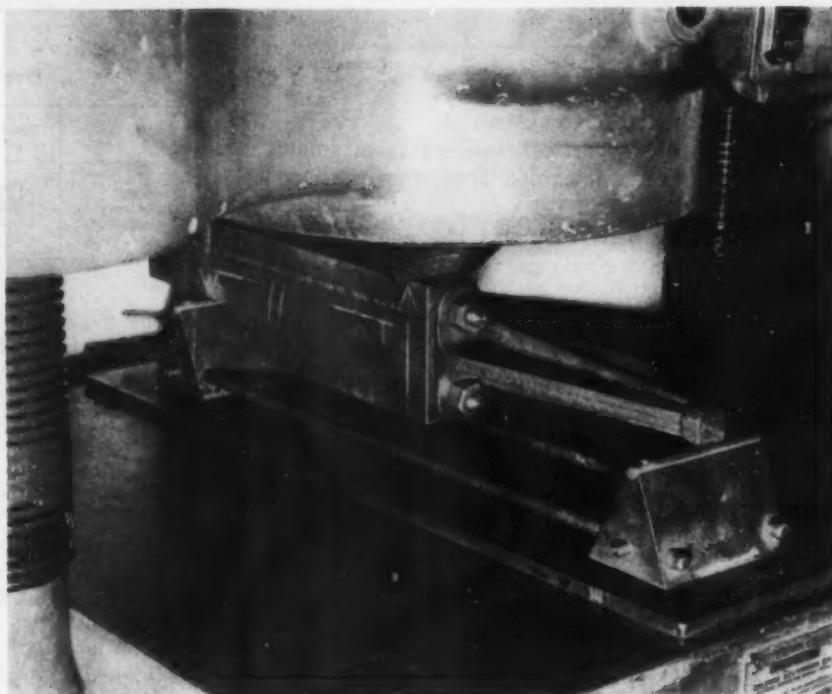


FIG. 8A—Testing a conveyor bracket which was cast in various metals to permit comparisons. The bracket is mounted on a heavy piece as it would be in service. See Fig. 8B for results.

bars from them. The results obtained are comparable with the results reported for the 1-in. keel block in tables II and III.

One interesting test has been made on a small casting which is not used in any compressor assembly. Fig. 8A shows the small casting in the form of a bracket mounted in a testing machine. The bracket is mounted on a rather heavy piece as it would be in use. This assembly was mounted in the testing machine, the distance between supports being 22 in., and bent to destruction. The maximum load required was recorded, one-half of

this load being supported at the end of the bracket.

Brackets made of Class 25 gray iron, malleable iron which was obtained from a customer, and ductile cast iron were tested, and the results are also shown in fig. 8B. The gray iron did not deflect to any extent and fractured at 2010 lb, the fracture being back at the support end. The ductile cast iron had a permanent deflection of 1.55 in. and required 5000-lb load to destroy it. The malleable iron deflected 1.45 in. which is about the same deflection as the ductile cast iron, but

B

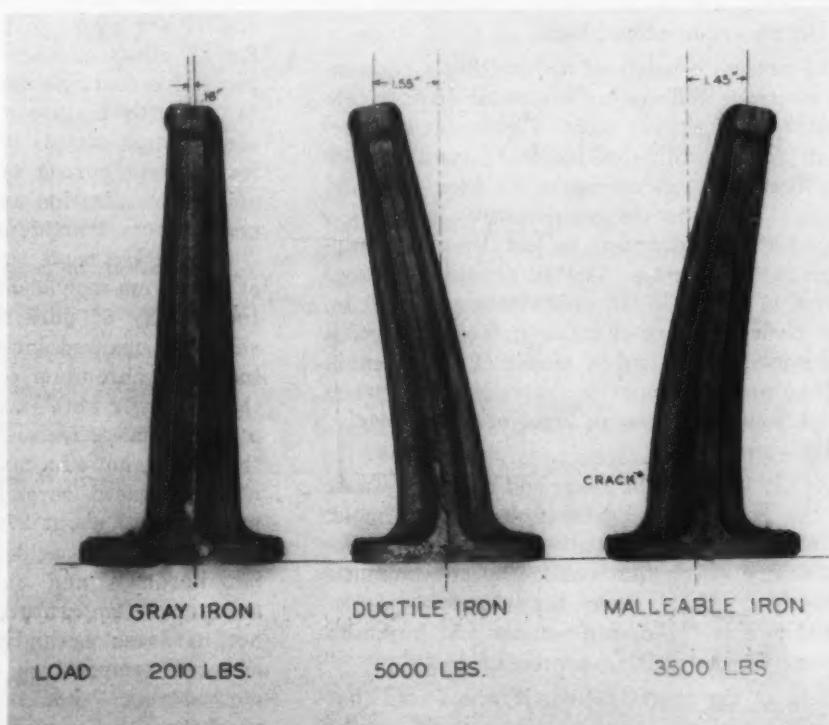


FIG. 8B—Results of the tests on the conveyor brackets (see Fig. 8A) cast in gray iron, malleable iron and ductile iron.

Ductile Cast Iron

Continued

only required 3500 lb to destroy it.

The physical properties obtained from small tensile test pieces machined from the castings are given in table IX.

The result of this test was the adoption of ductile cast iron for this part due to its greater load carrying ability.

In order to intelligently place ductile cast iron in the list of cast ferrous materials, it is necessary that it be compared to other materials. Two of the three tests reported do this. The authors do not wish to imply that ductile cast iron will

TABLE IX

Properties of Brackets

	Tensile, psi	Yield Point, psi	Elong., per cent	Hardness, Bhn
Gray iron.....	23,000			176
Ductile cast iron.....	72,000	56,300	9.1	171
Malleable iron.....	44,500	29,500	13.8	116

take the place of these other materials. It does have its place, which seems to be somewhere between malleable iron and cast steel as far as physical properties are concerned. Many more tests will be required to locate its exact place.

Arc Melting Molybdenum-Rich Alloys

MOLYBDENUM, with a melting point of 4750°F, has received serious consideration as a base metal for high temperature applications. Pure molybdenum, however, oxidizes very rapidly at relatively low temperatures and does not have high hot strength, although it can support weight at temperatures above the fusion points of the commercial heat resistant alloys.

Both the oxidation resistance and strength of molybdenum may be improved by making certain alloying additions. An investigation, conducted by H. D. Kessler and M. Hansen of Armour Research Foundation, Chicago, and reported at the 31st National Metal Congress in a paper entitled "A Study of Arc-Melted Molybdenum-Rich Chromium-Molybdenum Alloys," indicates that such alloys can be successfully arc-melted and cast in an argon atmosphere.

The process consists of arc melting a consumable electrode and casting the metal directly into a water-cooled copper mold. Electrodes are prepared from mixtures of powdered metals which have been pressed at moderate pressures and sintered at moderate temperatures to give a product strong enough to be handled and manipulated in the furnace. The electrodes used were approx ½ by ½ in. in cross-section and 18 in. long. Generally, two or more of these electrodes were joined end to end by means of molybdenum studs to form a composite electrode which, when melted, would produce an ingot of usable size.

The melting process consists simply of striking an arc between the lower end of the electrode and the base of the water-cooled copper mold. The electrode is then continuously fed into the mold cavity at constant voltage by an automatic mechanism. Metal from the electrode is deposited in a crater-shaped manner and forms its own crucible as melting proceeds.

Early in the investigation, it was found that chromium and molybdenum alloys could not be

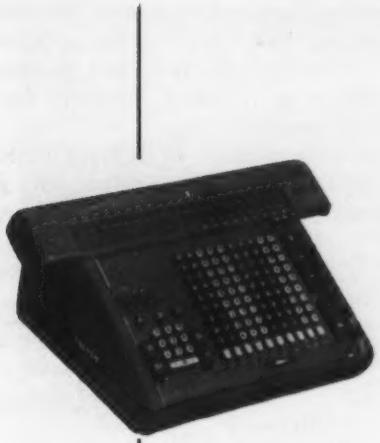
melted satisfactorily in a vacuum because of the high vapor pressure of chromium. A method was therefore devised by which the casting chamber could be evacuated and argon introduced at atmospheric pressure.

Carbon was investigated as a possible deoxidizer, but was found to be ineffective in the arc melting process. Small additions of beryllium were also made for deoxidation purposes, and were found to cause large increases in the hardness of molybdenum and chromium-molybdenum alloys.

Oxidation resistance for short periods of exposure in a static air atmosphere was evaluated at 1200°, 1500°, and 1800°F, and was generally found to increase with increased chromium content. The high oxidation rates produced at 1500°F for alloys with less than 20 pct Cr, and for all alloys at 1800°F, indicated that, unless protective coatings are applied, these alloys are not adapted for use above 1500°F in oxidizing atmospheres. Oxide films formed on the alloys tested were porous and nonproductive because of the volatilization and possible dissociation of molybdenum trioxide at 1500°F or more.

Tests were made to compare the forgeability of chromium-molybdenum alloys with the known forgeability of pure molybdenum. These tests showed a marked increase in forgeability with increased chromium content. Alloys with more than 4 pct Cr were extremely difficult to forge.

Hardness tests made at temperatures from 77° to 1600°F showed a marked increase in hardness with increased chromium content, reaching a maximum at about 27 pct Cr. Chromium additions of as little as 1 pct greatly increased the hot hardness and only moderately increased the room temperature hardness. Considering hot hardness as an indication of strength at elevated temperature, chromium additions to molybdenum should greatly improve this property.



*The new Friden Ultramatic Calculator
with electro-sprayed wrinkle finish*

Friden

Adopts

Electro-Sprayed Wrinkle Finish

Output raised 300 pct.

By F. B. SHEAR

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SUMMARY: Adoption of an electrostatically sprayed Wrinkle finish for the new Friden calculators, plus rearrangement of the finishing line to give straight line production, has resulted in a 300 pct increase in output, a decrease in rejects, and more good parts per gallon of paint. Details of the application of the Wrinkle finish and the new flow layout are discussed in this article.

High on the priority list in the recently completed \$1 million expansion program at Friden Calculating Machine Co., Inc., San Leandro, Calif., was complete modernization of the finishing department and allied operations. Actual benefits resulting from this have far exceeded all planning estimates; savings already obtained in a relatively short period of operation more than justify the effort exerted that influenced early completion of this portion of Friden's overall expansion program.

Costly hand spray methods were replaced with automatic electro-spray; and existing conveyer, booths and baking facilities were relocated to take full advantage of streamlining and floor space economies inherent with such a comprehensive change. Finishes, too, were investigated; and new developments in Wrinkles by

Electro-Sprayed Wrinkle Finish

Continued

Maas & Waldstein Co., a licensee of New Wrinkle, Inc., proved very beneficial.

Scheduling of work through the department received needed attention and arrangements were made to take full advantage of faster automatic processing by gearing the finishing department to subsequent assembly requirements.

Records kept during the comparatively short period since use of electrostatic Wrinkle spraying of cover parts of a new Friden fully automatic tabulating calculating machine and several other new models, show that production has been increased by some 300 pct over previous synthetic enamel hand-spray methods. This new increase has been achieved with a drop from 20 pct to 5 pct in the number of rejects and an increase in the number of good pieces per gallon of mixed paint from an average of 40 pieces per gal to 127 pieces per gal.

John Larson, paint leadman, reports that more uniform coverage with no runs or sags greatly influences the reduction in number of rejects. He also attributes success of the new installation to increased output over a shorter production period because of eliminated setup operations and minimized spray gun adjustments.

Also eliminated through installation of faster, more efficient electrostatic spray finishing has been the problem of storage. Now production is maintained on a daily schedule in keeping with the flow of completed calculators from the assembly lines.

From a direct labor saving viewpoint, three men have been saved for other duties within the department as a result of the electrostatic

Wrinkle-spray installations. Two loaders and a sprayman now complete the spraying of cover parts, while two loaders, two spraymen and two helpers were required formerly for each 8 hr the line operated.

The Friden taupe Wrinkle Finish, especially developed for use by Friden, was particularly adaptable to application by electro-spray. It

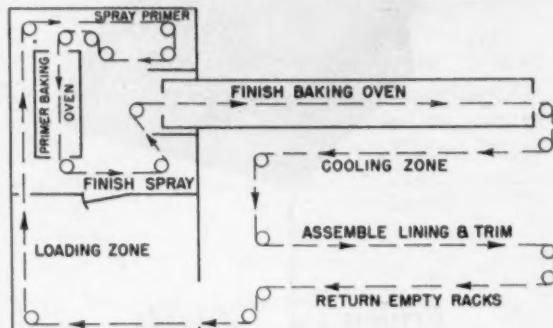


FIG. 2—Flow of parts in the rearranged finishing department illustrating the efficient direct line production setup developed.

showed vast improvement over the old finish in eye appeal, greater resistance to scuffing and marring, and increased wearability. Field reports indicate that customers prefer this non-glare Wrinkle finish to anything used in the past on the calculating machines.

Under previous hand spray methods, the cover parts were conveyed to spraymen on trays. The parts were sprayed one at a time and returned to the trays which were placed on a flat bed conveyor to carry the parts through the infra-red oven at a speed of 2½ fpm. Temperatures were maintained at 300°F, and baking required 17½ min.

Changeover from hand spray to electro-spray was relatively simple and inexpensive since the existing hand spray booths were large enough

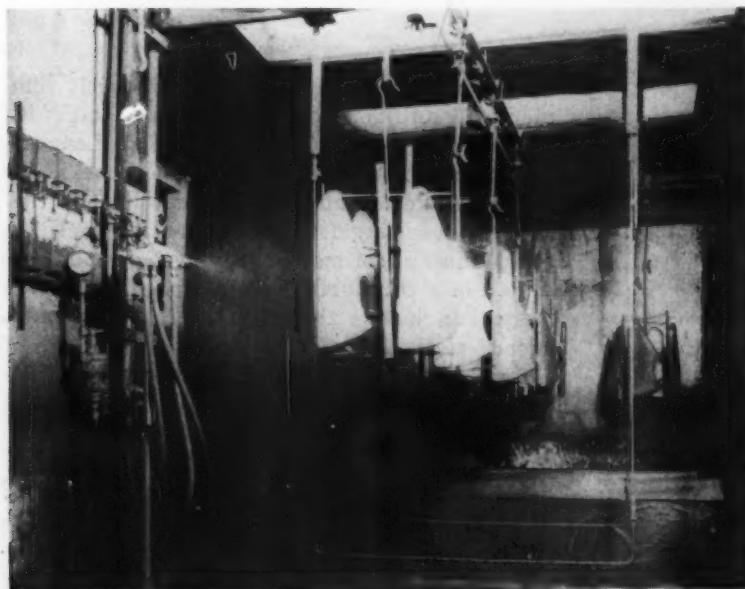


FIG. 1—Parts pass through a high voltage, low amperage electrostatic field, automatically receiving an evenly sprayed, uniform coating.

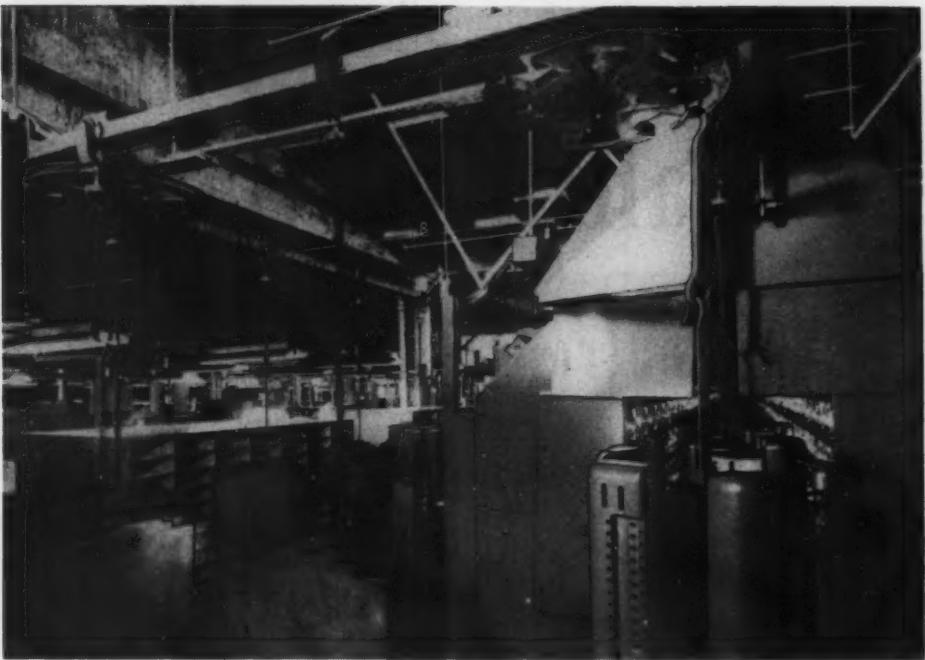


FIG. 3—Parts emerging from the infra-red baking tunnel enroute to the assembly section shown at the left.

to permit satisfactory conversion for the electrostatic equipment, as shown in fig. 1. The existing space in the 35 by 60 ft finishing department was also adequate, and it remained only to arrange the booths, ovens and conveyer for direct line continuous production, as shown in fig. 2.

A 354 ft long, overhead, Tipp Cable Way conveyer was installed to serve these operations in the following order: (a) electro-spray of primer coating material; (b) 4½ min primer bake in Fostoria infra-red at 260°F; (c) cooling zone to reduce work temperature to 110° to 120°F; (d) electro-spray of Wrinkle coating material; (e) 11½ min finish bake in Fostoria (see fig. 3) infra-red at 270°F; (f) cooling zone; and (g) transfer to assembly benches for hand lining and trimming operations.

Friden and Ransburg engineers developed workholders (see fig. 4) that not only carry 3 to

5 parts per fixture, but also permit coating the various parts with the same setting of the automatic guns. These workholders are spaced on 24 in. centers on the conveyer; thus a conveyer speed of 5 fpm easily provides the desired production volume.

While electro-static Wrinkle finishing of cover parts has eliminated several final stages in completion of the parts, preliminary preparations have been maintained almost the same as in the past in order to insure perfect spray painting surfaces.

Following fabrication in the punch press department and the sheet metal departments the aluminum covers are first passed through a trichlorethylene degreaser. Then they pass through an electrolytic cleaner, water rinse, 170 bonderizing treatment, hot rinse, chromic acid dip and infra-red dryer, and on into the electrostatic spray room for finishing.



FIG. 4—Parts being loaded onto the conveyer, which leads directly to the primer spray booth. Conveyers carry parts from the primer booth through a short cooling area, a drying tunnel and to the final spray booth.

Scale Reduction in Controlled Atmosphere

Cycle Annealing



By C. A. PAYNTOR

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THE concept of reducing forging scale to machinable limits simultaneously with a cycle annealing operation has become actual production experience at the Salisbury Axe Works, Division of Dana Corp., Fort Wayne, Ind. Cycle annealing has had widespread adoption for a number of years, and the practice of employing a controlled atmosphere for the prevention of scale, while comparatively recent as a production commitment in the steel fabrication industry, is not especially new in the general metallurgical field. However, the process of altering the reducible oxide of the forging scale to a machining consistency of the parent material had not been developed as a high production operation.

Salisbury Axe Works does not possess forging facilities of its own, but purchases forgings

from various commercial vendors. Other than those selected units or lots which are cleaned at the forging plant for inspection purposes, all forgings are received in the as-forged condition. The annealing of all gear forgings is done by Salisbury in order to establish consistency of structure and hardness which in turn leads to a reduction of subsequent machining and heat treating problems.

In the manufacture of passenger car rear axle assemblies at Salisbury, the principal steel composition used is A8620. While this standard grade is not particularly difficult to anneal on a single cycle, there must at the same time be adequate equipment flexibility to provide for satisfactory machining structures and hardness values from high to low side chemistries as well as potential future analysis. Where no finish grinding of

SUMMARY: Techniques and furnace equipment used at Salisbury Axe for reducing forging scale on steel parts to machinable limits simultaneously with a cycle annealing operation are described. The author covers furnace construction details, atmosphere composition, furnace cycle, production rates and operation costs involved in handling parts of A8620 composition at rates up to 3400 lb per hr.

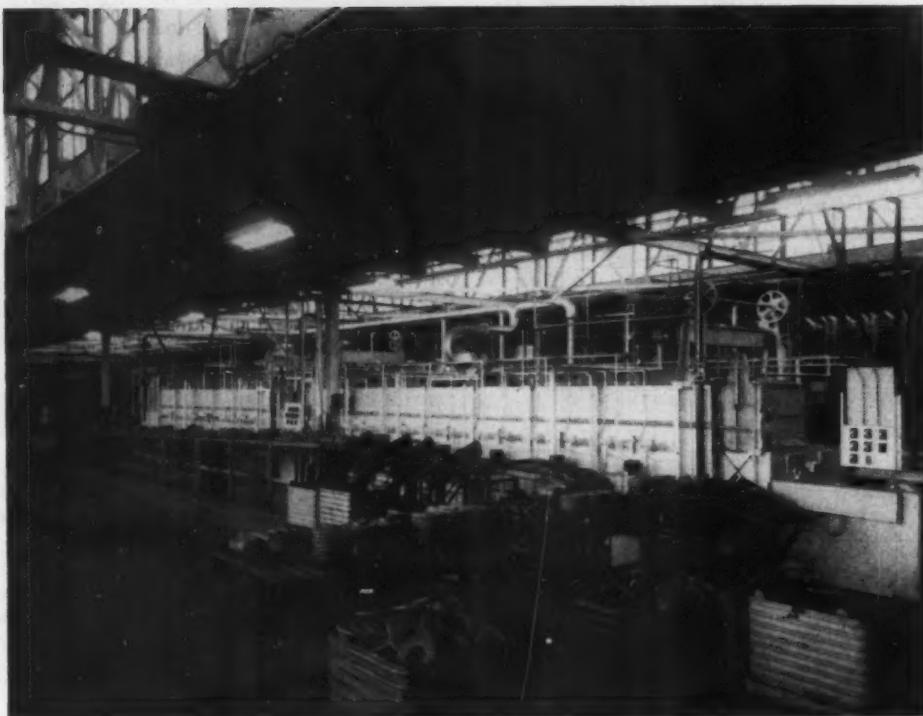


FIG. 1—Side view of furnace from the charging end.

the teeth is done after hardening, it is important that good surface finish in machining and minimum distortion during final heat treatment be considered in establishing the prescribed cycle.

Incorporation of atmosphere control is necessary and not only provides for a protective atmosphere but also reduces the forging scale to a point that it becomes readily machinable in later operations. This can be done in cases where the entire surface of the forging is machined and as a result the costly cleaning operation of the forging can be eliminated. The most recent addition to Salisbury's heat treating equipment is an annealing furnace designed to meet such requirements. The unit (fig. 1) was built by Geo. J. Hagan Company and was placed in operation almost a year ago.

Atmosphere Composition

The atmosphere within the furnace is a combination Exothermic-Endothermic type. From a theoretical point of view, the higher the reducing constituents in an atmosphere, the greater will be its reducing effect on scale of iron oxide. It is also very important that sufficient time at temperature be allowed to obtain specified reduction.

Since hydrogen is the most important reducing constituent in an atmosphere, laboratory tests were conducted on typical production forgings to show a reaction trend when the hydrogen content is gradually increased for a given period at temperature. As allowable temperature and length of furnace, along with productive capacity, control practical limits of time and temperature, test proceedings were set up with time and temperatures as index constants and a series of tests run with hydrogen as the only variable.

Composite samples of actual forging scale show a reduction by weight of 23 pct after complete reduction in hydrogen. Actual forgings covered with scale were exposed for a given period at 1700°F in atmospheres ranging from 12 to 75 pct hydrogen. After each run a sample of scale was removed from each forging and the extent of reduction was determined by completing the reaction in pure hydrogen. A curve, shown in fig. 2, was then plotted showing the effect of hydrogen on scale reduction.

The results of these tests obviously cannot be duplicated to the same degree in a production furnace due to such variables as slower heating rate, exaggerated contamination of atmosphere

Scale Reduction

Continued

from the large amount of oxide being reduced, etc. However, the curve, once established, presents a functional pattern for productive operation. It, therefore, becomes desirable to add endothermic gas, and thereby increase the H₂ content of the resultant mixture to a higher percentage than that which could be obtained from a straight exothermic gas.

This furnace atmosphere, consisting of 1000

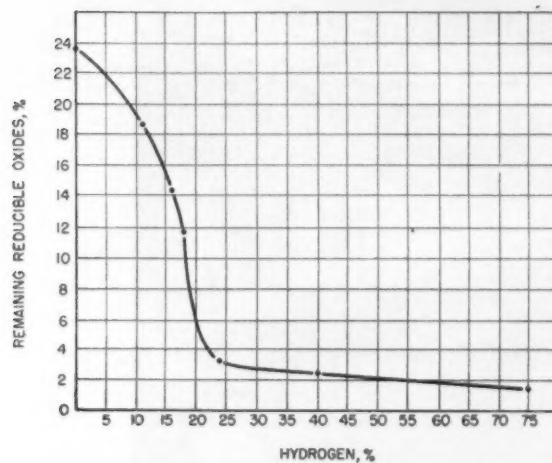


FIG. 2—Effect of hydrogen on scale reduction.

cu ft of exothermic with 1000 cu ft of endothermic shows the following analysis when checked under actual operating conditions: 21 pct H₂, 12 pct CO, 5 pct CO₂, 0.0 pct O₂, 0.4 pct CH₄, balance N₂. The dew point of such a gas is approximately 80°F.

The capacity of the exothermic machine is 5000 cu ft per hr, while that of the endothermic

machine is 1000 cu ft per hr. Gas admission pipes from the header are located along both sides of the high temperature and holding chambers, and in the top of the fast cool chamber.

Furnace Cycle Control

Considerable testing was carried out to establish the transformation temperature and the minimum holding time at temperature necessary to insure complete transformation over the entire 8620 chemistry range. In this test program, samples were transferred from a 1700°F furnace to a holding furnace at various temperatures, as 1100°F, 1150°F, 1200°F, 1225°F, and 1300°F. Complete transformation took place at 1225° to 1250°F. With 1250°F established as the transformation temperature, further testing was carried out to establish the proper holding time. These results showed that a minimum time of 2 hr gave complete transformation and that after about 4½ hr, a slight amount of spheroidization began to take place. Actual production forgings are held at 1700°F for 1½ hr, dropped to 1250°F in 18 min, and held at 1250° to 1200°F for 4 hr. This cycle is shown in fig. 3. The resulting blocky pearlitic structure (see fig. 4) has a hardness of 143 to 163 Bhn.

Furnace Design

As the products of combustion must not be permitted to contaminate the atmosphere, controlled heating and cooling presents many problems. Infiltration of air must at all times be prevented by the maintenance of a definite positive furnace pressure. This is accomplished by the installation of vestibules at both the charge and discharge ends of the furnace with ignition pilots at the outer vestibule doors. When the furnace is charged the charging vestibule is completely purged by a solenoid operated raw gas inlet operating in conjunction with a solenoid operated effluent line from the vestibule. A time clock permits this purging action

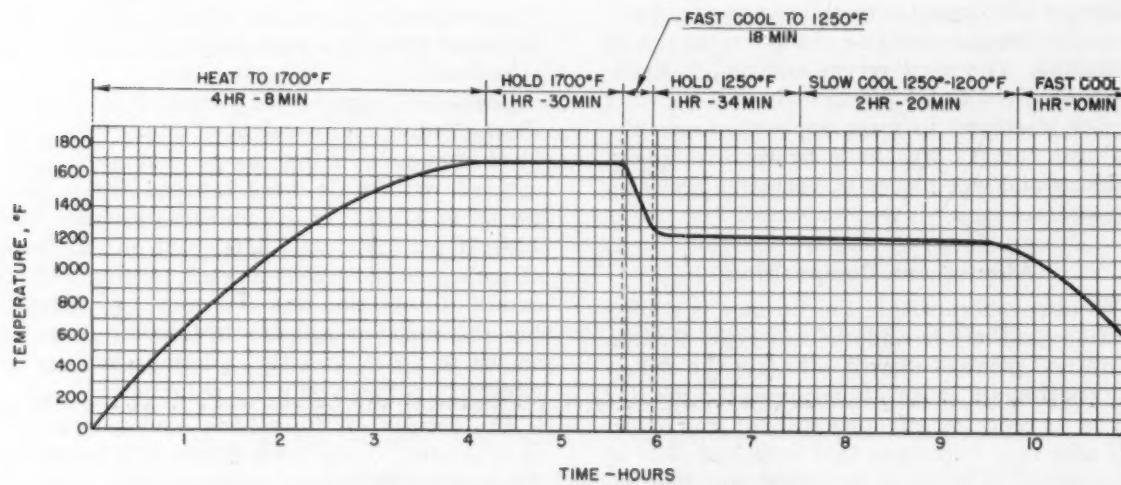


FIG. 3—Furnace cycle on 13.6 min pushing interval.

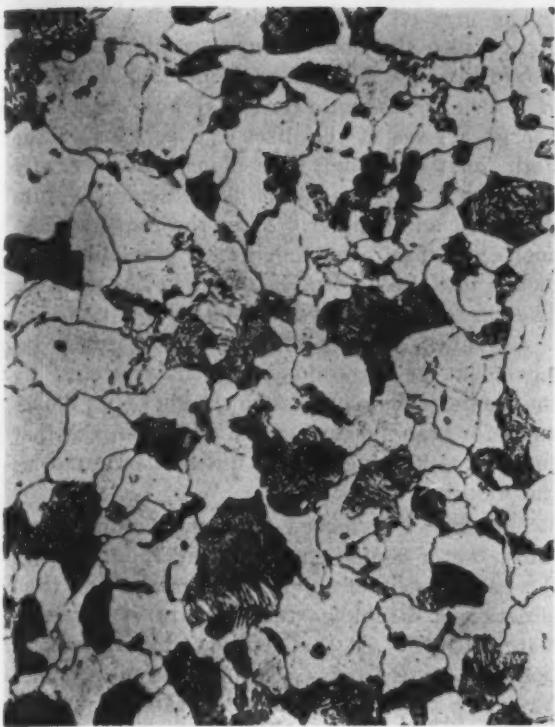


FIG. 4—Blocky, pearlitic structure resulting from cycle given in fig. 3. Hardness is 143 to 163 Bhn.

to continue for 1 min after the vestibule door closes, thus eliminating air contamination and its ill effects.

Combustion takes place within "U" shaped tubes placed above and below the roller rails

and all products of combustion are vented through eductor discharge legs. The tubes are fired with 1000 Btu natural gas, and are automatically ignited by spark plugs in the exhaust legs.

The furnace casing consists of welded plates and shapes, and incorporates a high heat chamber, fast cool chamber, holding chamber and automatic discharge set in tandem relation. It is of the roller rail pusher design, mechanically operated by means of twin screw chargers. There are two lines of alloy trays with each line riding on three rows of alloy roller rails.

Approximate overall length of the furnace is 83 ft, overall width 9 ft, and maximum height 12 ft. These dimensions, other than height, are enlarged somewhat by necessary floor space working requirements such as tray return conveyor, pullout area for tube replacement, etc.

The tray loading factor is based on 80 lb per sq ft of area, and, on this basis, trays were designed 32 in. wide by 16 in. pushing length. Each tray carries a net load of 284 lb per charge, and each unit pushing charge of two trays consists of 568 net lb. With two trays pushing simultaneously on a 13.6 min interval, a net production figure of 2500 lb per hr is attained. However, due to production emergencies, the furnace has been operated most of the time on a 10 min pushing interval with the constant tray load factor 284 lb. This faster cycle produces a net tonnage of approximately 3400 lb per hr.

Altogether the furnace is provided with 36

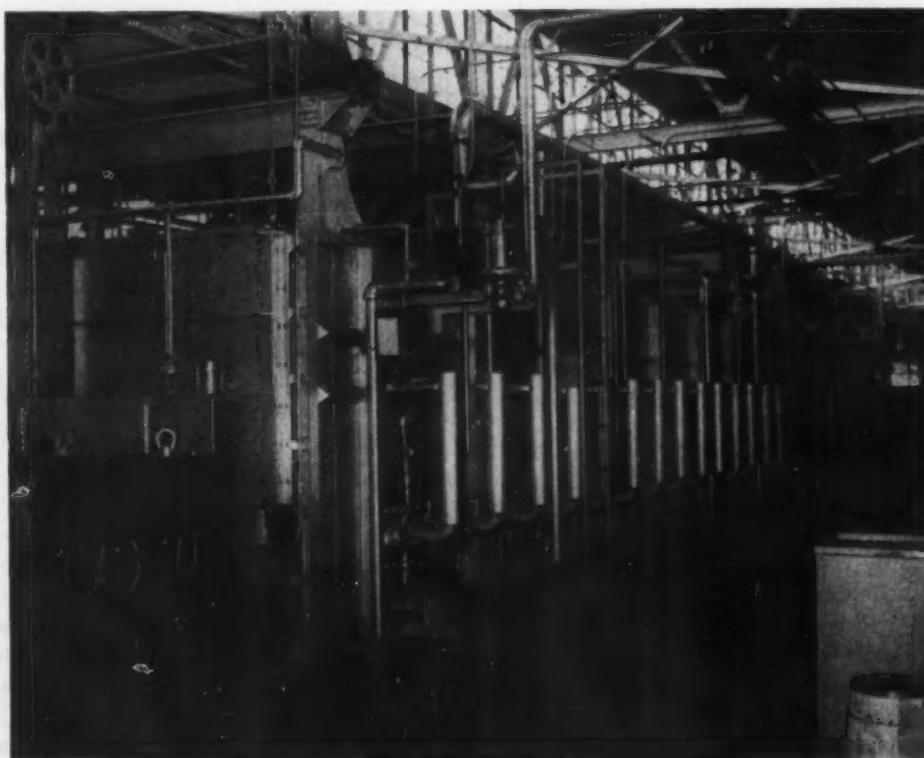


FIG. 5—Side view of the furnace showing radiant tube burners and gas safety shut-off valve.

radiant tubes located above and below the work, 28 of which are located in the high heat chamber and eight in the holding chamber, as shown in fig. 5.

The fast cool chamber is water jacketed, and during the fast cool periods, the charge is completely isolated from the high heat chamber and the holding chamber by means of doors which open and close automatically in synchronism with the movement of the two chargers. The transition from heating to cooling, and vice versa, is sharp and definite, and the cooling time is adjustable to suit the requirements of the steel under treatment. Complete accessibility to the entire fast cool chamber is provided by doors at each side which are approximately the same width as the length of the chamber. It was established that with a pushing interval of 10 min (3400 net lb per hr) the charge could be dropped from a temperature of 1700° to 1250°F in 18 min.

All five of the furnace zones are subject to automatic temperature control. The high heat chamber is divided into three zones, and the holding chamber into two zones. As the time element is the determining factor in the fast cool zone, no automatic temperature control is necessary.

The extreme flexibility of the equipment is illustrated by the fact that a great number of steel analyses, each requiring its individual cycle, may be satisfactorily annealed from day to day, usually without clearing the furnace with the conventional dummy charge. Zone temperature control and adjustable positive isolation in the fast cool chamber combine to insure satisfactory stress relieving and straight normalizing operations as well as full cycle annealing. Constant production with constant pushing intervals may be maintained, yet the cooling cycle may be varied over a wide range with a simple switch adjustment. Variable cooling is permitted in the furnace, and not outside in room temperature.

Furnace Operation

All phases of the operating cycle are automatic, and only one operator is required per shift. Since the time interval between pushes is relatively short, the unloading platform is located in an area adjacent to the loading table, and all trays are automatically returned, fully loaded. As the operator's time is not required at the discharge end of the furnace, he has ample time to load and unload trays, check furnace pressure gages and temperature recorders.

The product is charged through a side entrance into the superpurged vestibule, and is moved through the high heat chamber by means of a twin screw charger. As each successive charge arrives at the discharge position in the high heat chamber, the door automatically opens and the charge is moved rapidly into the fast cool chamber. After the required fast cool cycle has been completed, the charge is moved into the holding chamber in like manner. The charger which serves the holding chamber is built integral with the fast cool chamber. Its movement as an unloader is inaugurated by the master time clock. The timing of its movement for transferring the charge from the fast cool to the holding zone is under the control of the auxiliary clock.

The charge is moved from the holding zone into a water cooled chamber, and then through the rear vestibule on power driven rolls, thus effecting a discharge temperature of approximately 650°F. At the extreme discharge position, the loaded trays are automatically transferred to a pneumatically operated conveyer and returned to the unloading station near the front of the furnace.

Operational Cost

Direct fuel consumption approximates 3800 cu ft per hr of 1000 Btu natural gas, with the breakdown as follows: 3060 cu ft per hr for furnace heating, 170 cu ft per hr exothermic gas, and 570 cu ft per hr endothermic gas.

After about a year of operation, it has not been found necessary to replace any of the original tubes. Power must be provided only for the motor operated doors, the chargers, and for one blower. Cooling water is circulated through a closed system in conjunction with an evaporator type heat exchanger.

The expense of purchasing, operating, and maintaining abrasive or chemical cleaning equipment is permanently eliminated, and no equipment of this type exists in the Salisbury plant. Various units which go to make up the rear axle assembly are received in an as-forged condition, subjected to the specified annealing cycle which simultaneously reduces the hard constituents in surface scale to machineable limits. forgings are routed directly from the furnace to the machining lines.

This particular type furnace, just as any single piece of equipment, cannot be classed as a cure-all for all annealing, machining, and cleaning ills. In plants where the finished product has unmachined areas which must be carefully cleaned, a reducing atmosphere is not applicable. Rather, in this instance, a simple exothermic atmosphere for the conventional purpose of scale prevention would be satisfactory.

Air-Hardening Tool and Die Steels

Distortion Factors.

Internal Stresses

and Hardenability

By C. B. POST

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DATA shown in previous parts of this article have been presented to illustrate the relative amount of distortion and size change between air-hardening tool steels and other grades of steel, air hardenability in large sections, and the mechanics of air cooling. The available air-hardening tool steels were considered, and from this group of steels, three were chosen to form a matched set of air-hardening tool and die steels, as follows:

(1) Air-Wear, containing 1.5 pct C, 12 pct Cr, 1.25 pct Mo, and 1 pct V;

(2) Air-Hard, containing 1 pct C, 5 pct Cr, and 1.25 pct Mo; and

(3) Air-Tough, containing 0.70 pct C, 2 pct Mn, 1 pct Cr, and 1.25 pct Mo.

Tool and die applications described herein for the air hardening steels are meant to illustrate conditions which indicate the need for an air hardening steel.

Fig. 7 shows a set of automobile brake shoe coining dies which are successfully made from either Air-Hard or Air-Tough. This set of dies works under extreme pressure, because the brake shoe is given its exact shape in this coining operation. The metal is reduced 0.002 to 0.003 in. in thickness, and the wear on the die is very severe. However, Air-Wear steel was not suc-

SUMMARY: Uniform through-hardening, coupled with elimination of special quenching and handling equipment, makes air-hardening steel especially suitable for large tools. In this concluding part of a three-part article the author describes typical applications to illustrate the flexibility of air-hardening steels in tool and die problems.

Air Hardening Steel*Continued*

cessful on this operation because a fair amount of toughness is required in the dies to resist the high pressures involved at the flange of the shoe. Lack of distortion on hardening is a prime factor in the selection of an air hardening steel for this job, since distortion over the large circular part of the die would substantially increase the costs of the tool.

Fig. 8 shows a mandrel for perforating a brass tube. The operation consists in slipping a tube over the mandrel, punching 11 holes through both sides of the tube on one stroke, then giving the tube a quarter turn and punching a second

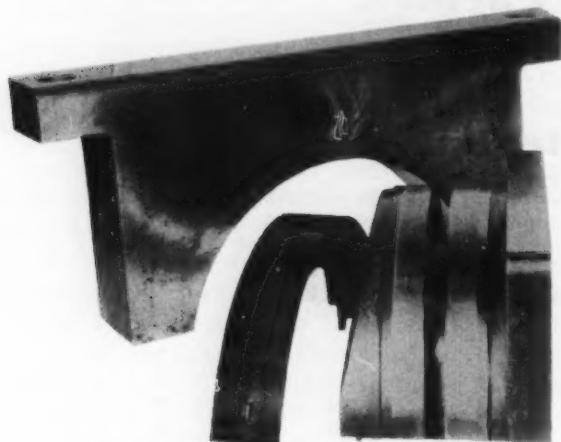


FIG. 7—A set of automobile brake shoe coining dies made from air-hardening steel.

set of holes, thus completing the tube in two strokes. The operation is done on an ordinary punch press, production being about 1000 tubes per hr. The job requires that the mandrel have considerable strength, the steel should show no warpage or distortion after heat treatment, and if possible, the mandrel should show good wear resistance to sliding brass against steel.

The steel previously used in making this mandrel was an oil hardening chromium-nickel steel containing about 0.70 pct C, which gave production of about 80,000 pieces. Air-Wear was put on the job, and in addition to cutting the actual cost of making the mandrel because of low distortion and size-change, production was increased to about 240,000 pieces. The threaded shank is drawn back at a higher temperature than the actual mandrel to increase toughness at the flexure point.

Another application of the Air-Tough steel is in a blanking ring and draw die for a two-quart aluminum sauce pan. Using this steel 500,000

In parts one and two, the author discussed the general characteristics of air-hardening steels, and the mechanics of air hardening, as well as distortion factors, internal stresses and hardenability of these steels.—Ed.

pieces were run without sharpening. After the 500,000 pieces were made, the bolster plate shifted on the double acting press and the draw die moved out of alignment. The shift was as much as 1/16 in. and the arm of the press broke. There was no damage to the dies.

Fig. 9 shows a rim-roll made from Air-Tough. This roll was used to make tire rims, and is classified as a 6.50-16 divided rim circling roll. The roll works on 0.156 in. pickled and annealed SAE 1010. Almost every known tool steel has been tried on these rim rolling jobs, and the requirements are quite complex. If the steel is tough, but does not attain hardness of at least 60 RC, the wear is excessive and dressing cost is high. If the steel gets too hard, or has high alloy content to get wear resistance, its impact strength is generally not sufficient to resist spalling on the working surface, or even breakage of the roll itself. Air-Tough gives a good account of itself on this type of job because of its ease of forging, ease of heat treatment on these heavy sections, and substantially nil distortion and size change resulting in low finishing cost on cleaning after heat treatment. Fifty thousand rims per grind were obtained consistently on this job with Air-Tough.

Fig. 10 is a compound blanking die made from the Air-Tough member of the air hardening matched set. The blanking portion of the die has small sections of approximately $\frac{3}{8}$ in. thickness from which the cutting sections of $\frac{1}{16}$ in. project at right angles to the base. There was no warpage with Air-Tough, and the absence of distortion and size change contributed to the successful performance of this die. The uniformity of hardness in thin and thick sections was also an advantage in heat treatment. The steel previously used for these dies was of the



FIG. 8—A mandrel for punching holes in the wall of a brass tube. The threaded shank is drawn at a higher temperature than the actual mandrel to increase toughness at the flexure point.

oil hardening nondeforming grade, and was changed to Air-Tough to get away from warpage when oil quenching uneven sections. What scale is formed is a powdery scale, easily removed in the hard-to-get-at recesses by stoning. An average of 45,000 blanks were obtained per grind with Air-Tough, whereas about 30,000 per grind were obtained with the oil hardening nondeforming grade previously used.

Fig. 11 is a compound lamination die which is somewhat unique in its requirements. The series of small lamination punches are bolted together



FIG. 9—A divided tire rim circling roll. Air-Tough steel was air-cooled from 1550° F and drawn 4 hr at 450° F to produce a hardness of Rc 59 to 60.

and must be held to a total tolerance of 0.0005 in. per in. of length. The small wafers to make the lamination punches were cut from bar stock, and the material being punched was Bakelite. Air-Tough was used successfully in making this die.

Fig. 12 shows a re-rounding die to true up large tubes that have become eccentric in shape due to bending. The dies were previously made from medium carbon alloy steel and were not hardened because of the size of the dies and the resultant expense in getting the large sections back into shape after hardening. The dies were made of Air-Tough, finished to size, and then heat treated by air cooling from a large car-type annealing furnace at 1550°F. The scale was easily taken off with emery and the die was ready for service at hardness of 58 Rc. The behavior of these hardened dies indicates that they will probably run the life of the machine without further replacement.

Fig. 13 shows a die made of Air-Wear for blanking and forming lawn mower side frames. The tool problem was to form a full periphery flange $\frac{5}{8}$ in. high on $\frac{1}{8}$ in. thick low carbon steel, and emboss the design and strengthening rib in one operation. There was considerable discussion on the design of this tool. The shop favored a sectional type of die, or at least an inserted type. This would permit them to make the base of softer material and insert hardened tool steel on the working edges only, making repairs simpler and cheaper. The engineering department argued that if a tool steel could be found that would give sufficient wear resistance and a high degree of toughness, a one-piece die would perform more satisfactorily and require less maintenance. Air-Wear was recommended and put to work. Supplied as an egg-shaped ring approximately 19 in. OD (longest dimension)—11 in. ID (longest dimension)—4 in. thick, full hardness was obtained with negligible distortion. The Air-Wear dies produced over 50,000 frames without redressing.

Fig. 14 shows a gage for checking automobile ring gears after heat treatment. Indicators are used on the gages and the gears rotate clockwise and counter-clockwise on the face of the gage, checking any off-tolerance dimensions, and measuring the results in "tenths." However, the gears were not finish ground and presented a very abrasive surface causing excessive wear on the gages. High carbon high chrome steels, chrome plated gages and carburized gages had been used without success. In a few hours of service all of them wore to a point where they had to be scrapped. Finally, the gages were made from Air-Wear, hardened to Rc 64 to 65, and gas nitrided for 70 hr. Because of the secondary hardness of Air-Wear, the core hardness at 900°F was Rc 58 to 59 and the surface was extremely hard. In the first few weeks of operation, these Air-Wear gages surpassed the performance of every other gage used.

Fig. 15 shows a compound die for piercing and blanking 10 in. fan blades from 22 gage cold-rolled steel on a press at the rate of 750 per hr. The tool problem was that production per grind was too low, and excessive size change in hardening resulted in an unbalanced fan blade. Air-Hard was selected for its better cutting qualities and hardening accuracy. More blades are produced per grind and the total life of the dies is greater. In addition, the distortion problem is solved, and the Air-Hard die is turning out perfectly balanced blades by the millions.

Fig. 16 shows a punch and die for punching at one stroke 1600 holes (9/64 in. diam) in $\frac{1}{8}$ in. thick cardboard to form a punchboard. Because of limitations of press equipment, the user of the

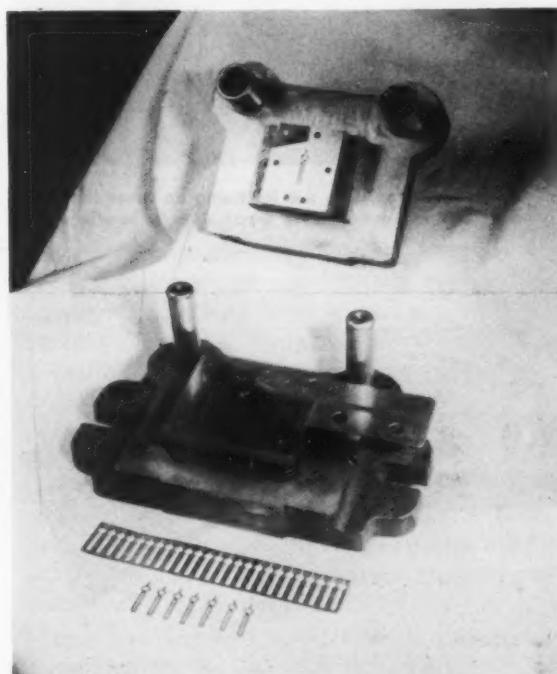


FIG. 10—A compound blanking die used for working 0.006 in. thick phosphor bronze at spring temper.

Air Hardening Steel*Continued*

die insisted on a one-piece job. Ordinarily the tool designer would have designed an indexing die. The die as designed measures 10 x 8 x 2 in. Originally made from an oil hardening steel, the die cracked in hardening between the light and

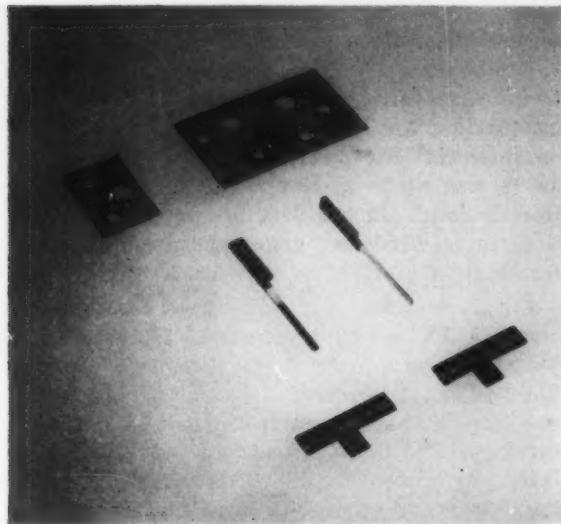


FIG. 11—A compound lamination die for punching Bakelite

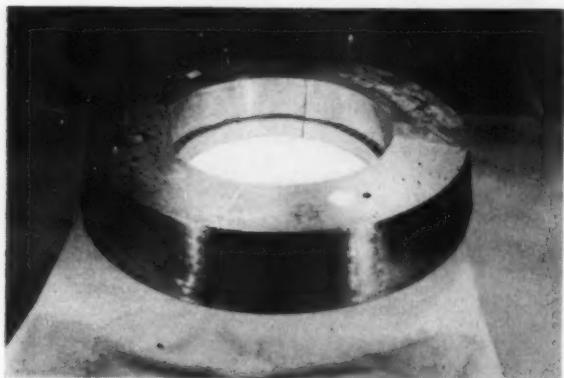


FIG. 12—Re-rounding die for truing up tubes that have become eccentric in shape due to bending.

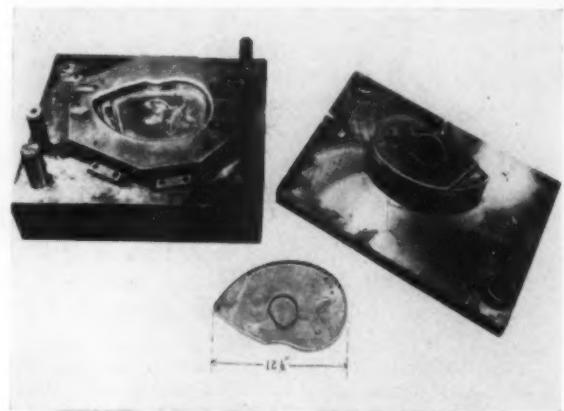


FIG. 13—A die made of Air-Wear which formed over 50,000 lawn mower side frames without redressing.

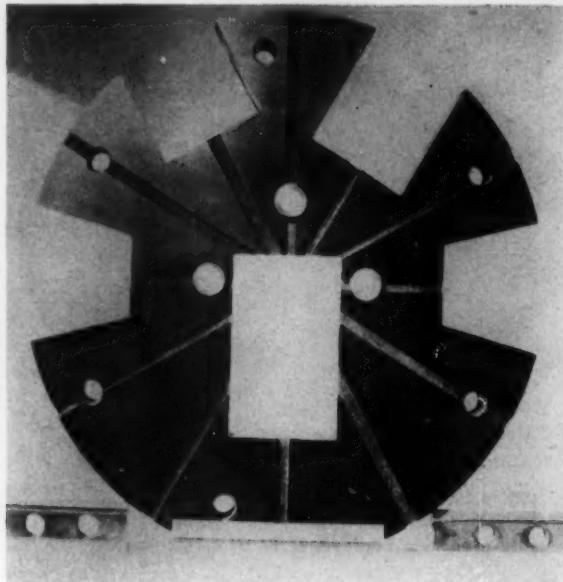


FIG. 14—Gage for checking automobile ring gears after heat treatment. Use of Air-Wear steel considerably reduced wear and extended the life of the gage.

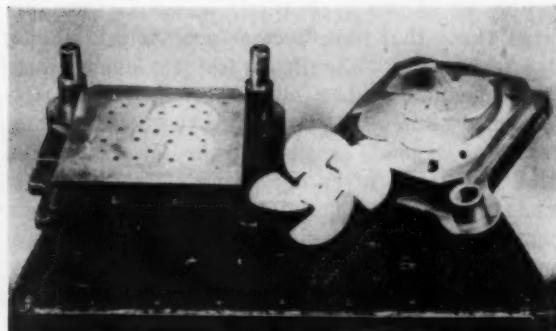


FIG. 15—Compound die for piercing and blanking 10 in. fan blades from 22 gage cold-rolled steel.

heavy sections along the junction of the drilled-out center and the edge. Air-Hard was selected for greater hardening accuracy and safety, and sufficient wear resistance for the job. The Air-Hard die hardened free from cracks and without noticeable size change. Production was very satisfactory. (Because the punches presented no hardening problem, they were made from an oil hardening steel.)

Fig. 17 shows a special jig fixture made of Air-Tough to provide accurate location for straddle milling eight bushings for roller bearings while simultaneously slab milling eight more. The bushings are placed in the 16 vertical holes (1.1405 in. plus 0.0005 in. diam) and are clamped four at a time by the cam operated lever. Each of these levers clamps two parts by applying pressure to the clamping plate. At the same time, the lever clamps the parts in the holes in the opposite side of the fixture. The tool problem was complex. First, the jig was large with extremely unbalanced sections. Second, the hole

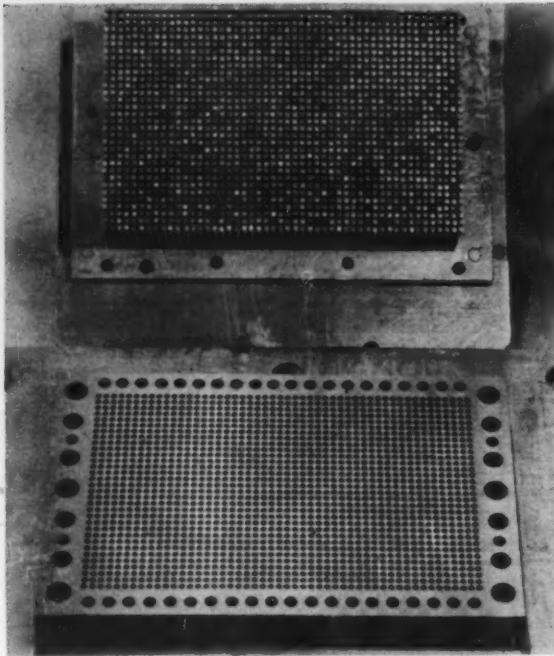


FIG. 16—Punch and die for punching 1600 holes at one stroke in $\frac{1}{8}$ in. thick cardboard to form a punchboard.

size had to be held to 0.0005 in. and in line for the length of the jig to within 0.0015 in. after heat treating. Because of these unusual requirements, the toolmaker used Air-Tough for the job.

Distortion was checked very carefully before and after heat treating. Before heat treating, the block was placed on two ground pins in the fixture base to produce a sliding fit, thereby sizing the holes and checking length measurement.

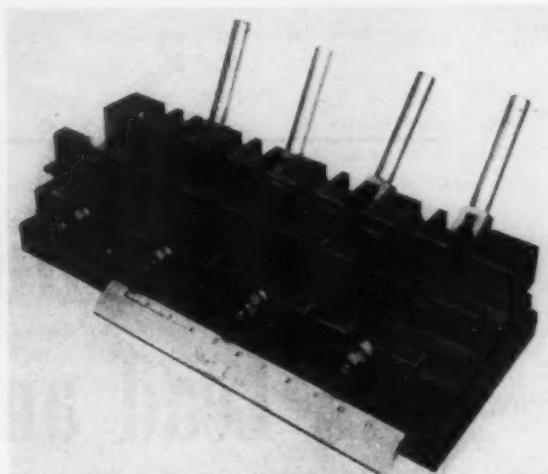


FIG. 17—Jig fixture to provide accurate location for straddle milling eight roller bearing bushings while simultaneously slab milling eight more.

After heat treating, hole size and length were again checked by replacing the block on the ground pins. There was no detectable change in hole size or length. Further, the maximum measureable size change in any direction was held to only 0.0002 in. The low austenitizing temperature of Air-Tough contributed largely to the control of size change.

The examples of applications of air hardening tool and die steels shown were chosen to illustrate some of the more desirable features of this group of steels. Use of these steels should be considered when problems involving warpage, distortion, size change and uniformity of hardening in large sections become of prime importance in making a successful tool.

SPRAYING PAINT WITH STEAM

A PROCESS for spraying organic finishes with superheated steam instead of compressed air has been developed recently by E. I. du Pont de Nemours & Co. In use for some months at several plants, this technique is said to offer several advantages over conventional paint spraying methods.

Simultaneous heating and atomizing of the paint at the gun nozzle eliminates the need for preheating the paint with a heat exchanger. Heat of the steam permits spraying at higher viscosities and higher solids, making possible a reduction in the volatile material content, and producing faster coverage of the work. Steam spraying may be done at the same pressures (normally 55 to 70 psi) with the same type of guns used in compressed air spraying, but with an insulated handle. Cost of the superheated

steam was found to compare favorably with that of compressed air. Both reduced high pressure steam and superheated low pressure steam installations have been used with good results.

Booth maintenance is reduced and cleanliness of the spray booth is considerably improved with this method. Steam spraying was found to be extremely flexible over a wide range of pressures, temperatures and viscosities. It substantially reduces sags and runs by a more even dispersion of the paint, and one user reports a saving of approximately 15 pct in material, with less overspray.

One problem encountered with steam spray is the heat in the gun handle and trigger. New guns are under development to overcome these difficulties.

Determination of Arsenic In Lead and Tin Alloys



By LOUIS SILVERMAN
Los Angeles, Calif.

SUMMARY: A rapid method for the colorimetric determination of arsenic in lead and tin alloys is described. The technique employs sodium hypophosphite as a selective reducing agent for arsenic chloride in a strong acid solution.

ARSENIC, in the low range of 0.02 to 0.12 pet, is an important constituent of lead for batteries, and at higher percentages the lead alloy is used for babbitt, known as arsenical lead babbitt. In most of the leads the minimum-maximum spread for arsenic is quite narrow and, when processing an alloy, a rapid control test is a necessity; also, a rapid test for the detection of arsenic in unknown lead samples is desirable.

In precision analytical procedures arsenic is first distilled^{1, 2} as chloride to separate arsenic from antimony, tin, lead, copper, etc. The arsenic may then be titrated with iodine, bromate,³ or cerate, or may be determined colorimetrically as a molybdenum blue.^{4, 5} A shorter, less accurate method will suffice for control work.

In this proposed procedure, sodium hypophosphite is used as a selective reducing agent for arsenic chloride in strong acid solution.⁶ In the chemical reaction penta and tervalent arsenic compounds are reduced to elementary arsenic which appears as a colored colloid, and the intensity of coloring indicates the amount of arsenic present in the solution.

The technique of this procedure is simple. The alloy is dissolved in nitric acid and fumed with perchloric acid. After cooling, a measured amount of cold 1:1 hydrochloric acid is added, the mixture stirred, 3 to 4 g of sodium hypophosphite are added and then the solution is heated below the boiling point. If arsenic was present in the alloy the solution will be colored.⁷

If a 1-g sample is used, then arsenic in the

amount of 0.01 pct may be detected when the 100 ml solution is compared to distilled water; 0.02 pct As appears as a light yellow solution; 0.03 pct As is brownish, 0.04 to 0.05 pct is reddish-brown and 0.06 to 0.07 pct is blackish. These are for 100 ml volumes.

Above 0.07 pct (0.07 mg), arsenic in 100-ml volume is difficult to estimate. It is therefore advisable to dilute solutions containing 0.08 to 0.14 pct (0.08 to 0.14 mg) arsenic to 200 ml for convenient estimation. Thus, 0.10 pct arsenic would be quite dark in a 100 ml solution, but the same amount of arsenic (1.0 mg) would be yellow to brown in a 200-ml volume, and may then be conveniently estimated.

A 2-g sample may be used for arsenic in the 0.005 to 0.01 pct range.

Standard Solutions

For the first few test runs, the analyst should prepare a series of 100-ml standards such as 0, 0.01, 0.02, 0.03, 0.04, and 0.05 pct As. The intervals 0.015, 0.025, 0.035 and 0.045 pct As may easily be adjudged by eye. At the same time a test run is made with the unknown lead alloy, and the coloration obtained with the unknown alloy is compared with the standards. By this procedure, Bureau of Standards sample No. 53b (0.04 pct As, 84.3 pct Pb) was estimated colorimetrically as 0.04 pct As. Higher range standards are prepared when necessary.

When applying this method, the lead may contain the following elements: 0 to 12 pct Sb, 0 to 20 pct Cu, 0 to 10 pct Sn, and 0 to 0.7 pct Bi, as well as small amounts of iron, aluminum, zinc, cadmium and manganese. Unusual amounts of nickel, chromium or cobalt may interfere because of their inherent colors. Tin-base alloys (Bureau of Standards sample No. 54a) and solders are difficult to handle because stannic oxide, formed during the perchloric acid fuming, will cause bumping unless "bumping beakers" are used. Tin-base alloys may be dissolved directly in sulfuric acid as outlined.

Copper salts accelerate the solution of lead in nitric acid. Hypophosphorous acid reduces the cupric ion before acting on the arsenic ion, and it seems that the presence of copper aids in rapid formation of elementary arsenic.⁷

A standard arsenic solution should be prepared in the following manner: Weigh 0.1320 g arsenious oxide (As_2O_3) and transfer it to a 100-ml beaker. Add 10 ml of 5 pct sodium hydroxide solution, and warm until the powder dissolves. Dilute the solution to about 50 ml with cold water, drop in a piece of litmus paper and add 1:3 sulfuric acid until the litmus paper turns red. Transfer the solution to a 1-liter volumetric flask, dilute to the mark with water, and mix. One ml equals 0.10 mg As, or 0.01 pct in a 1-g sample.

Estimation of arsenic in lead-base alloys may

be accomplished in about 25 min using the perchloric acid method.

For arsenic content of 0 to 0.07 pct, use 150-ml beakers; where the content is from 0.08 to 0.14 pct use a 250 ml beaker; and when arsenic is 0.15 pct or higher, use appropriate aliquots or adjust the size of the sample.

Weigh a 1.00-g sample of sawings and transfer them to the beaker. Add 5 ml of copper nitrate solution (10 g of $Cu(NO_3)_2 \cdot 5H_2O$ in 100 ml of water) and 10 ml of 1:1 nitric acid solution. Cover the beaker and warm to dissolve the alloy. Add 6 ml of perchloric acid and evaporate until heavy fumes of perchloric acid are emitted, and then cool.

Prepare a cold 1:1 hydrochloric acid solution and add this to the cool perchloric acid beaker (95 ml for the 150-ml beaker, 195 ml for the 250-ml beaker). Mix, add 3 to 4 g of sodium hypophosphite, and stir. A white precipitate (salt) may form. Transfer the beaker to a warm plate and maintain at 190 to 212°F for about 10 min until the blue copper color fades and the

TABLE I
Typical Alloys in Which Arsenic May be Estimated Colorimetrically

	Analysis, Pct									
	As	Pb	Sn	Sb	Cu	Bi	Fe	Ni	Al	
B. of S. No. 53b	0.04	84.30	5.05	10.30	0.21	0.07	0	0.01	0	
B. of S. No. 54a	0.03	0.21	88.61	7.32	3.75	0.02	0.04			
Anti-friction	low		75	12.5	12.5					
Battery Lead	0.05	94		6		0				
Britannia	low		91	7	1.4					
Lead Shot	0.2	99.8								
Magnolia	low	90	10							
Pewter	low		85	1.7	6.8	6				
Solder	low	67	32	0.5						
Type Metal	low	82	3	15						
White Metal	low	75	5	19	1					

arsenic color develops. Estimate the arsenic content by comparison with standards. If a 2-g sample is used for very low arsenic, the amounts of 1:1 nitric acid and of perchloric acid should be doubled.

Tin-Base Alloys

When evaporating tin solutions of nitric and perchloric acid mixtures, insoluble tin oxide forms in a finely divided state, and the oxide causes bumping. For this reason tins, tin-base alloys, tin-lead solders and lead alloys which contain more than 10 pct Sn are analyzed for arsenic by the sulfuric acid method. The alloy is dissolved directly in sulfuric acid, and fumed until all of the white sulfur has disappeared. After cooling, the sample is diluted with a water-hydrochloric acid mixture and completed, as for lead alloys. The lead- and tin-base colors for arsenic are identical. Bureau of Standards sample No. 53 (0.03 pct As) was estimated

Determination of Arsenic*Continued*

colorimetrically as containing 0.03 pct As.

The sulfuric acid technique is not recommended for higher antimonial leads because, if a 1-g sample is dissolved in 10 ml of sulfuric acid, a dark residue may be obtained⁶ which obscures the arsenic color.

Weigh a 1.00-g sample of sawings and transfer it to the beaker. Add 10 ml of sulfuric acid (sp gr 1.84), cover the beaker with a watch glass, hold the beaker with tongs, and heat in an open Fisher burner flame. Rotate the beaker continually in the flame until all of the sulfur

The author expresses his appreciation to Bruce Chalett, Robert Bernstein and Harry Schwartz for helping to make this article possible.

has disappeared and sulfuric acid condenses on the wall of the beaker. Cool the beaker in air, then in water. Add 10 ml of water and again cool the beaker. Add 0.1 to 0.2 g of copper sulfate, and mix.

Prepare a cold 3:2 hydrochloric acid solution and add this to the sulfuric acid beaker (85 ml for the 150-ml beaker, 185 ml for the 250-ml beaker). Mix, add 3 to 4 g of sodium hypophosphite, and stir. The procedure is then completed in an identical manner to the perchloric acid method.

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Ceramics for High-Temperature Use

RESULTS of recent tests have suggested that several ceramic bodies developed by the National Bureau of Standards have marked superiority, in both strength and creep characteristics at 1800°F and above, over the best available high-temperature metal alloys. Laboratory data indicate that these ceramic bodies, especially designed for use in jet engines and gas turbines, possess special properties at the elevated operating temperatures of these power plants.¹

Designs in the regions of temperature and stress far beyond the potentialities of known metallic alloys, prompted a survey of nonmetallic compounds, especially the oxides, silicates, carbides and related combinations peculiar to ceramics. Tests commenced in 1944 involved bending stresses at 1800°F and relative resistance to thermal shock.

Four general methods of test, the first two of which may be described as step testing, were followed. Each combination of stress and temperature was maintained for about 160 hr. Conditions were then changed by an increment of either stress or temperature, until failure, for a total of 109 tests. Strengths in tension up to 18,000 psi at 1800°F, and 15,000 psi at 1900°F were observed. Above 1900°F, however, the strengths dropped off rapidly to average about 5000° psi at 2000 to 2200°F.

Resistance to creep also decreased rapidly, for the particular porcelains tested, when tempera-

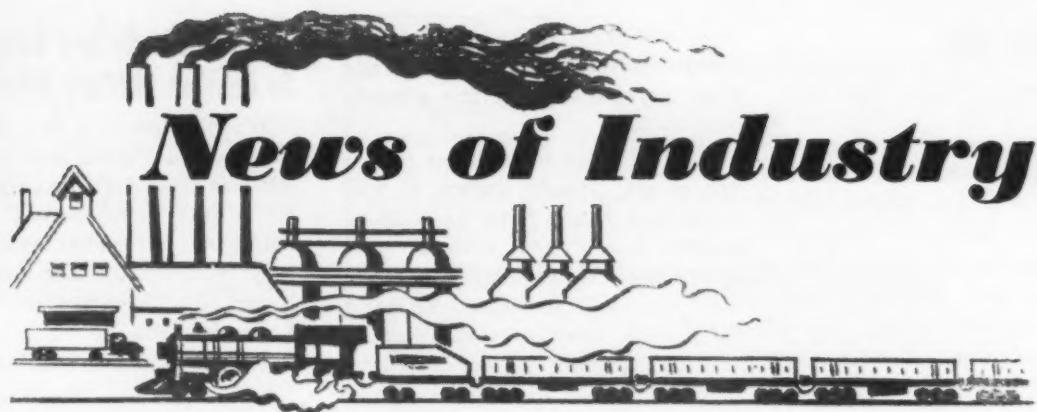
TABLE I

Stress-Temperature Data on Four High-Strength Ceramic Bodies

Temperature (°F)	Maximum Stress (psi) National Bureau of Standards Ceramic Bodies			
	No. 358	No. 353	No. 151	No. 4811C
1500°	13,000	13,000	12,000	14,000
1700°	14,000	13,000	13,000	14,000
1800°	17,000	18,000	18,000	18,000
1900°	8,000	4,000	15,000	16,000
2100°	.....	.....	.....	6,000

tures were raised above the range of 1800° to 1900°F. Results showed that even the comparatively low stress of 6000 psi caused more than a tenfold increase in the rate of creep at 2050°F compared to the rate at 1800°F and the porcelains on which these tests were made were the most resistant to creep of any investigated.

Maximum observed creep rates, for all bodies tested, may be summarized as ranging from about 0.0001 to 0.0002 pct per hr at 1700°F for the range of stresses used; from 0.0002 to 0.0008 pct per hr at 1800°F and a stress of 16,000 psi; and from 0.0030 to 0.0040 pct per hr at 1900°F and 10,000 psi stress. The maximum stress at rupture for four National Bureau of Standards' ceramic bodies at various temperatures is given in table 1.



News of Industry

New England Explores New Financing Plan

Idea is old but application is new . . . Might provide vast new sources of capital for industrial expansion . . . Plan may finance new steel mill—By BILL PACKARD

Boston—New England may soon become the proving ground for a new technique in financing industrial expansion. If the idea works in actual practice it might open the doors to vast new sources of low-cost capital which could be used for expansion of industry.

The idea is not new. It has already been used by the Federal and State governments in countless instances. But it is thought to be new in its application as a source of capital for private enterprise.

State Helps Business

The plan calls for establishment of an industrial plant authority within a state. This plant authority uses the credit of the state to borrow money from those who are driven by heavy Federal tax laws to put their money into safe places not ordinarily available to industry. It does it by selling bonds to individuals, savings banks, trustees and trust companies.

The plant authority can then finance construction of new facilities for existing companies or for new ones. The companies would pay a rental to cover interest, amortization and taxes. The bonds

issued by the plant authority would pay a low rate of interest because they would be exempt from Federal income taxes. Provision is made for eventual complete ownership by private interests through amortization, appraisal at maturity, or both.

Four States Studying It

At least four New England states are now studying proposals of this type. They are New Hampshire, Rhode Island, Massachusetts and Connecticut. In addition, the Steel Committee of the New England Council has seized on it as the best method of financing an integrated steel mill in New England.

Salient Figures Noted

The New England Council is the organizational hub of efforts launched in March 1947 to increase steelmaking capacity in New England (see THE IRON AGE, Jan. 27, 1949, p. 109). Since then a vast research program has been undertaken and virtually completed by the Council and the Federal Reserve Bank of Boston.

Early in January figures summarizing probable market poten-

tial, plant and raw material costs, type and amount of production and prices are expected to be made public.

These figures are expected to show a market of 7 million tons of carbon steel within 200 miles of the plant site. They will probably show total cost of construction of an integrated mill at about \$175 per ton (if ownership of raw material sources and transportation were included this figure would probably shoot up to \$300 per ton). At first, only facilities for

Turn to Page 114

Strikes Affect Unemployment

Washington—Secondary unemployment resulting from the steel and coal strikes were still being reflected in unemployment compensation claims in November. New weekly claims, averaging 344,000, were 32,000 higher than in October. Continued claims, at 1.9 million a week, were 147,000 higher than for the previous month.

Inland Declares \$1 Extra

Chicago—At a board of directors meeting held on Nov. 30, Inland Steel Co. declared a year end cash dividend of \$1.00 per share on 4,899,315 shares of capital stock outstanding. The dividend is payable Dec. 20, 1949, to stockholders of record at the close of business on Dec. 12 this year.

New Financing Plan

Continued from Page 113

making coke, pig iron, ingots, slabs, hot and cold-rolled sheets and strip and light plates are planned.

A breakeven point in the low 70's is anticipated, although this has been figured down into the 60's. Production of products planned does not ordinarily fluctuate as widely as output of structurals, rails, etc. Including working capital, the total cost estimate will amount to about \$225 million.

Negotiations Continue

Rumors that a "Midwestern" steel company had already signed up to participate in the venture are unfounded. Negotiations are known to be continuing with three steel producers.

As negotiations with steel companies advanced it became apparent that financing would be a major problem because of high taxes and scarcity of new sources of equity capital. Important segments of industry have repeatedly warned that lack of new capital is becoming an increasingly grave problem—might eventually stifle industrial growth.

List Financial Details

Thus evolved the plan for an industrial plant authority. Maine has already formed the Maine Development Credit Corp., with lending power of about \$2 to \$4 million. It is thought to be unique in the U. S. It is designed to assist business within that state. It differs from the industrial plant authority plan. But it reflects a trend in thinking in New England—that every assistance will be rendered by the state to facilitate the growth of industry. This includes proposed revision of tax structures in some States.

As presently planned, the financing of the steel mill will be as follows: \$150 million of the total \$225 million needed will be provided by the steel plant authority. The remaining \$75 million would be furnished by the operating

steel company and by private interests in New England. The funds from private sources are already available.

Plans for an organizing corporation are already drawn. It will commence functioning as soon as papers are signed with a steel firm. From this embryo it is hoped will emerge the New England Steel Corp. Eventual ownership of this corporation will be shared by private investors in New England and the participating steel firm which furnishes its president. A majority of the board of directors will be from New England.

Much has been done, and much remains to be done. Possible revision of the Federal tax structure is one of the imponderables which could cause a change in thinking.

Pioneering In Finance

But if the plan works out as New Englanders see it now, it could cause quite a commotion in financial circles and elsewhere. At any rate, it can safely be said that Yankee ingenuity is still on the prowl. The rock-ribbed coast of New England is still populated with a pioneer spirit—this time exploring new frontiers in finance.

Resume Your Reading on Page 113



"In the interests of economy it is recommended that the same officers be reelected since we have a large quantity of stationery bearing their names still on hand."

Employment Review Board To Pass on Military Information

Washington—An Industrial Employment Review Board to pass on appeals from decisions which deny to military contractors or their employees access to classified military information has been established by Secretary of Defense Louis Johnson.

The new board will consist of four members—a chairman designated by the Munitions Board, and one member each to be designated by the Secretaries of the Army, Navy, and Air Force. The Munitions Board has named John T. Mason, a consultant on production matters, to be the chairman.

Military contractors or individual employees denied access to classified military information by action of the Personnel Security Board or field agencies of the three military departments may, within 30 days of the denial, appeal to the Industrial Employment Review Board. The board may establish area or regional boards.

Soss Mfg. Co. Boosts Output

Detroit—Installation of a sixth production line for automobile hinges by Soss Mfg. Co. has been completed and the line is now in operation, according to Charles J. Soss, president.

The new line increases the company's production facilities to a new peak, and was made necessary by a steady postwar growth in volume of business, Mr. Soss said.

British Electrical Team Arrives

Washington—A British team representing the electrical starting and control gear industry has arrived in the United States for a 6-week study of American productivity methods.

Eight manufacturing cities will be visited for observance of manufacture of both hand-operated and automatic motor starters and controllers for use with industrial motors.

Car, Truck Registrations Establish an All-Time Record

Detroit—The automobile population has increased 4 million units since 1948. Figures compiled by R. L. Polk & Co., Detroit, statisticians for the automobile industry, disclosed that on July 1, 1949, car and truck registrations had passed the 40 million mark, establishing an all-time record.

Passenger car registrations are up 9.8 pct, Polk said. The largest increases were mostly in the south and western parts of the United States with Utah, Louisiana, Alabama and Arizona showing the biggest gains.

Truck registrations are also at an all-time high. The increase since 1948 averaged 7.5 pct. Arizona leads other states with an increase of 31.7 pct in new truck registrations, Polk said. A decrease in truck registrations was reported in the District of Columbia, Rhode Island and New Jersey, it was disclosed.

Organizes New Door Concern

Los Angeles—Acme Metal Molding Co. has been organized and succeeds the California Fireproof Door Co. in the manufacture of store fronts. The company has also been appointed a jobber of Alcoa architectural products.

Heads West N. Y. Scrap Men

Buffalo—Terence G. Hanlon, manager of the Buffalo office of Luria Bros. & Co., Inc., has been elected president of the Western New York Chapter of the Institute of Scrap Iron & Steel Inc.

French Coal Production Rises

Washington—French monthly coal output, with Marshall Plan aid to the extent of \$5.2 million worth of American machinery and equipment, is expected to reach a rate of 54 million metric tons by the end of the year. This is but a million tons short of the French 1929 and 1930 record production, but still short of supplying French needs.

Schwab Memorial Library Dedicated at Bethlehem

Bethlehem—A new library on steelmaking was formally opened here last week at the general offices of Bethlehem Steel Co. with top officers of leading steel companies in attendance. It is open to the general public and is dedicated to the memory of the late Charles M. Schwab, who founded the world's two largest steel companies.



Speakers were Walter S. Tower, president of the American Iron & Steel Institute; Eugene G. Grace, chairman of Bethlehem, and Benjamin F. Fairless, president of U. S. Steel Corp. They are shown, left to right, in the accompanying photograph.

"Schwab had vision," said Mr. Fairless, in keynoting the tributes to Mr. Schwab. "The creed of his success may be

summed up in his own words, 'There is no job too commonplace to express the individuality of the uncommon man.'"

Mr. Grace warned that "The idea of individual opportunity has been increasingly under a cloud during the current trend toward socialistic thinking, but I believe that ultimately when future histories are written the wisdom of Mr. Schwab's principles, based on his knowledge of human nature and economics, will be acclaimed as the true path of opportunity."

Commenting on the way management is today bedeviled, Walter Tower remarked that "The sun already has set on the days of unfettered management, when vision, courage and persistence brought results like those which are honored here. . . . The ideal manager of the future might well be a composite of trained steel man, lawyer, financial expert and diplomat."

The board of directors of the American Iron & Steel Institute devoted its December meeting to the occasion, which was 70 years after Mr. Schwab's first employment in the steel business.

Wheeling Pays \$1 a Share

Wheeling, W. Va.—The board of directors of Wheeling Steel Corp. declared a dividend of \$1.25 per share on preferred stock and \$1 per share on common stock, payable Jan. 3, 1950, to stockholders of record Dec. 9.

Revere Pays Extra Dividend

New York—An extra dividend of 50¢ on common stock has been declared by directors of Revere Copper & Brass, Inc. The current declaration brings dividend payments for the year to \$1.50 as compared with \$1.25 last year.

STEEL FINISHING FACT SHEET

Comparison between equipment costs and economies effected—old vs. new equipment

Light Gage Hand Mills

Number of men required to operate—11
Production, average per hr per mill—1.25 tons/hr
Unit weight, single unit of production—150 lb
Power required to operate—300 hp
Maximum length, single hand mill product—12 ft
Cost, light gage hand mill and complimentary facilities—\$150,000

Tin Plating
Old tin pot crew, number of men required—5
Production, one hot-dipped tin pot—1.25 tons/hr
Cost, one hot-dipped tinning pot—\$20,000

New Tandem Cold-Reduction Mill

Number of men required to operate—8
Production, average per hr per mill—50 tons/hr
Unit Weight, single unit of production 30,000 lb
Power required to operate—10,000 hp
Maximum length new tandem mill product 20,000 ft
Cost, new tandem cold-reduction mill and complimentary facilities \$8,000,000

Facilities

New continuous electrolytic tinning line, number of men required—5
Production, continuous electrolytic line—12 tons/hr
Cost, continuous electrolytic tinning line—\$1,150,000

Closing of Last Hand Mill Marks 15 Years' Improvement

Granite City, Ill.—Granite City Steel Co. marked the completion of the company's 15 year \$20 million modernization program recently when it closed its last hand mill.

In the past year the company has installed a continuous tandem cold reduction mill, which rolls strip 56 in. wide. Other modernizations have been a continuous pickler, temper mills, annealing furnaces, electrolytic tinning, etc., which makes this mill one of the most modern in the country.

Power, Speed Stepped Up

At the moment, major alterations recently started will increase the output of the electric tinning line by at least 50 pct. The project includes enlargements that will cost an estimated \$450,000. Excavation work on the site is now in progress and concrete foundations for the winding reel has been poured. This line will be shut down for several months during the first quarter of next year when the major new installations will be made.

Power and speed all along the line will be greatly increased by

changes now underway. The four motor generators which provide power for the present line will be replaced by 15,000 amp generators. Also, Westinghouse induction flow brightening equipment has been ordered and will be installed which will add 60 pct to the capacity of that unit in the electrolytic tin line.

At the celebration held last week at Granite City, the company distributed a fact sheet which precisely compares the equipment cost and economies effected between the new equipment and the old method of rolling sheets. The progress of almost two decades in one field of steel manufacture is represented in these figures of comparison, see table.

Construction Employment Steady

Albany, N. Y.—A total of 234,000 workers were engaged in the construction industry in New York State in October, only 300 less than in September, according to Industrial Commissioner Edward Corsi. Of the total, 129,300 were employed by special trades contractors, 67,200 by general building contractors and 37,500 by general contractors other than building.

Canadian Ingot Output For October Shows a Gain

Toronto—Canadian production of steel ingots and castings in October amounted to 258,891 net tons, and compares with 240,748 tons in September, and with 281,866 tons produced in October 1948.

For October the Dominion Bureau of Statistics revised its figures on Canada's rated capacity for steel ingots and castings, bringing the total up from 3,838,000 net tons a year to 3,898,000 net tons. Canada's steel furnace capacity now stands at: Ingots, basic openhearth, 3,024,000 net tons; electric, 574,000 net tons; and total ingots, 3,598,000 net tons a year. Steel castings, 300,000 net tons a year.

For the 10 months ending with October cumulative production of steel ingots and castings totaled 2,663,259 net tons compared with 2,643,253 tons in the like period of 1948 and 2,440,025 tons in 1947.

Following are comparative monthly production figures:

Month	Steel Ingots	Steel Castings
January	275,987	8,720
February	249,009	10,262
March	287,885	10,576
April	260,319	9,649
May	283,808	9,371
June	261,476	8,979
July	232,499	6,331
August	241,442	7,307
September	232,882	7,866
October	252,965	5,926
Total 10 Mos.	2,578,272	84,987
	1948	
January	247,768	8,958
February	230,183	9,463
March	275,349	10,677
April	254,315	9,951
May	279,688	9,879
June	249,710	9,655
July	238,104	6,768
August	254,362	8,692
September	248,622	9,243
October	272,127	9,739
November	267,671	10,307
December	271,128	9,297
Total	3,089,027	112,629

France's Bauxite Output Rises

Washington—France expects to produce about 800,000 metric tons of bauxite this year, only a little more than was produced last year but about 100,000 tons more than the prewar average, the Dept. of Commerce reports.

Small Business Favored On Tie Bids in Military Contracts

Washington—Tie bids on military contracts are slated to be decided in favor of small business.

The General Accounting Office has stated that it favors the awarding of military procurement contracts to small concerns, in the event both large and small firms submit similar bids on any given contract.

The GAO statement followed disclosure by Defence Dept. procurement officials that tie bids were resolved by the drawing of lots. This practice was sharply criticized by Representative Cellar, D., N. Y., chairman of a House subcommittee investigating monopolistic tendencies in business.

Jess Larson, General Services Administrator and number one purchaser for the federal government of nonmilitary supplies, has stated that his agency follows the pro-small-business policy recommended by GAO.

Gas Supply to Be Increased

Chicago—Chicago's natural gas supply will be increased by 60 pct late in 1950. Peoples Gas Light & Coke Co. will construct a new 30 in. pipeline from the Texas Gulf Coast which will terminate in Joliet. Texas Illinois Natural Gas Pipeline Co., a Peoples Gas Light & Coke Co. subsidiary, on Dec. 5 filed application with the FPC to build the 1400-mile pipeline. The line will have a 300 million cu ft daily capacity which can be increased to a volume of at least 500 million by 1955 or 1956.

Guarantees Dollar Conversion

Washington—The Export-Import Bank, acting for ECA, has signed a contract guaranteeing Barber-Greene Co. of Aurora, Ill., that \$27,000 in new working capital invested in its British subsidiary plus any earnings of up to \$20,000 may be converted into dollars.

Like the parent company, Barber-Greene Olding & Co., Ltd.,

manufactures roadbuilding machinery and materials handling equipment and parts. About 60 pct of production, made from domestic materials without dollar expenditures, will go into the export markets.

Exports Down; Imports Up

Washington—A decrease in shipments of metals and manufactures, especially steel mill products, was a major cause for United States exports dropping from \$904 million in September to \$848 million in October. Meanwhile, general imports rose \$29 million to \$559 million, largely due to increased receipts of petroleum and cattle.

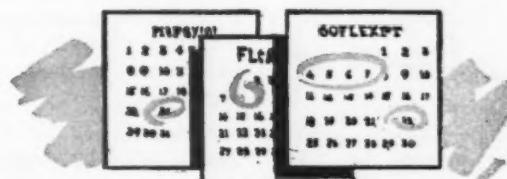
Factory Earnings Decline

Albany, N. Y.—The average weekly earnings of production workers in New York State factories declined 64¢ to \$57.60 between September and October of this year, according to Industrial Commissioner Edward Corsi. During October, average hourly earnings were \$1.49 and the average work-week was 38.7 hr.

Urge Cooperation Between American and British Scientists

Chicago—Closer cooperation and better interchange of information between United States and British scientists on the development of infrared photoconductors was being urged by Dr. John E. Barkley, supervisor of physical chemistry research at Armour Research Foundation located here. Dr. Barkley has just returned from a 2-week tour of laboratories in the United Kingdom and he reports that in some aspects of the work we are ahead of the British but in other phases they have outdistanced us. Dr. Barkley believes that a free interchange of information and even the photocells themselves would permit both countries to move faster on their development projects.

Infrared photoconductors have large use in both military and civilian application. During World War II they were used to enable American soldiers to see in the dark for short distances. Current research is aimed at extending this distance, the spectral range, and finding new uses for the application.



Dates to Remember

Jan. 9-13	Society of Automotive Engineers, annual meeting, Detroit.
Jan. 14	American Electroplaters Society, annual meeting, Chicago.
Jan. 15-19	Associated Equipment Distributors, annual meeting, Chicago.
Jan. 16-18	Truck-Trailer Manufacturers Assn., annual convention, Edgewater Park, Miss.
Jan. 20	Malleable Founders' Society, semiannual meeting, Cleveland.
Jan. 22-24	Institute of Scrap Iron & Steel, Inc., annual convention, Washington.
Jan. 23-27	American Society of Heating & Ventilating Engineers, annual meeting, Dallas.
Feb. 12-16	American Institute of Mining & Metallurgical Engineers, annual meeting, New York.
Mar. 21-22	Steel Founders' Society of America, annual meeting, Chicago.
Apr. 3-4	Assn. of Iron & Steel Engineers, spring conference, Birmingham.
Apr. 5-7	Midwest Power Conference, Chicago.
Apr. 10-14	American Society of Tool Engineers, industrial cost-cutting exposition, Philadelphia.

INDUSTRIAL SHORTS

VALVE CLINIC—It has been announced that the COOPER ALLOY FOUNDRY CO., Hillside, N. J., has scheduled, what is believed to be the country's first stainless steel valve clinic for Jan. 25. The clinic will be in the form of a dinner-meeting in Pittsburgh.

ARCS AWARD—The Associated Retailers & Civic Assn. of Granite City, Ill., has presented its annual award for "meritorious civic achievement" to the GRANITE CITY STEEL CO. for "its interest, efforts and accomplishments in helping remove smoke and fly ash from the atmosphere of this community."

IN BUSINESS—Announcement has been made of the formation of MORRISON INDUSTRIES, INC., Cleveland, headed by John R. Morrison, president. The firm offers a complete engineering, construction and installation service in oven, furnace and wire equipment.

MORE DIECASTINGS—An addition to its Chicago plant is being built by DOEHLER-JARVIS CORP. The company manufactures aluminum and zinc alloy diecastings.

EXPANDING—A new building will be erected by ST. CHARLES MFG. CO., St. Charles, Ill., on a site near its present plant. The addition will permit expanded volume for the manufacture of steel kitchen cabinets and allied lines.

CLEVELAND OPENING—New offices have been opened at 3344 W. 105th St., Cleveland, by SIZE CONTROL CO. and WALSH PRESS & DIE CO., Chicago divisions of American Gage & Machine Co. Hugh G. Collins and Wallace W. Denhoff will be in charge of sales and service.

HAPPY ANNIVERSARY—This year SCHRAMM, INC., West Chester, Pa., manufacturers of air compressors, are celebrating their fiftieth anniversary.

BUYS—The entire outstanding capital stock of Martin & Schwartz, Inc., Salisbury, Md., producers of gasoline pumps, has been purchased for \$2 million by SYMINGTON-GOULD CORP., Depew, N. Y., from the Socony-Vacuum Co., Inc., Standard Oil Co., Sun Oil Co. and Continental Oil Co. The purchase contract carries the provision that the four oil companies will purchase a guaranteed number of pumps over the next 5 years.

NEW LOCATION—The Atlantic factory sales and service branch of BLACK & DECKER MFG. CO., manufacturers of portable electric tools, has been moved to a new building at 316 Techwood Drive, N. W.

WIRE REP.—John A. Roebling's Sons Co., Trenton, N. J., has appointed INDUSTRIAL WIRE PRODUCTS CORP., Los Angeles, as its exclusive representative for all of southern California, Arizona and New Mexico.

ADDITIONAL LIGHT—A plant addition is being made by BENJAMIN ELECTRIC MFG. CO., Des Plaines, Ill. They plan expanded production of industrial lighting and signaling equipment as well as enameled products.

REPRESENTATIVE—The Standard Transformer Co., Warren, Ohio, transformer manufacturers, has appointed the BRADLEY CO., Washington, as its representative for the states of Virginia, Maryland and the District of Columbia.

Swiss Industrialist Urges Lowering of Trade Barriers

Believes in free trade and sees a future in multilateral agreements.

New York—Lowering of trade barriers throughout the world was urged by Dr. Walker C. Boveri, chairman of Brown, Boveri & Co., Ltd., Switzerland, at a press conference here last week.

Dr. Boveri is here for a week's stay, during which time he will discuss the market for turbine generators with power company officials. His firm manufactures a variety of electrical equipment, its list of products being similar to those of General Electric Co. or Westinghouse Electric Corp. in this country. Brown, Boveri has subsidiaries operating in France, Italy, Germany and Norway. Plants in Austria, Poland and Czechoslovakia have been confiscated.

Business Is Spotty

The Swiss industrialist said that he had always believed in free trade. But he admitted that multilateral agreements seemed to hold forth more promise at the present time. He said that he would be satisfied if other countries would match the tariffs of Switzerland.

Business with his firm is spotty, he said. He said that his company had a backlog of about 18 months to 2 years on heavy equipment. But on light stuff it is operating at about 35 per cent of capacity.

The Marshall Plan has not greatly helped or hindered the Swiss economy, Dr. Boveri reported. He said that his country did not sign up for it because it did not want to be obligated to the United States. "At some future date, factories financed by ERP may furnish us stern competition," he said, "but we are not afraid of competition."

Buys Abandoned Trolley Line

Allentown, Pa.—E. Schneider & Sons, Allentown, recently purchased the abandoned Bethlehem-to-Easton trolley line from the Lehigh Valley Transit Co. The firm will tear up the roadway for salvage of 1000 tons of rails.

Machinery Builder Elected Head of NAM

Industrialists attending fifty-fourth meeting hear Johnson, Hoffman, Bricker, Moulton . . . Perils of rising Federal taxes and spending cited with fears on growth of welfare state.

New York—Claude Adams Putnam, president of Markem Machine Co., Keene, N. H., was elected president of the National Association of Manufacturers at the fifty-fourth Congress of American Industry held here last week.

Mr. Putnam, whose first job was that of apprentice in a Torrington, Conn., machine shop, boasts that his company, which has about 200 production employees, has never laid one off since it started business in 1911. The company makes power driven marking machinery.

Some 3000 industrialists attending the meeting heard warnings of the way their jobs were being made more difficult by rising taxation, new Federal welfare programs, a shortage of venture capital, and wastefulness in government spending.

Defense Spending Cut

Secretary of Defense Louis Johnson told the group that military expenditures for the current fiscal year would be held down to \$13 billion, or \$1.5 billion less than the figure used by President Truman in November in predicting a \$5.5 billion deficit for the year.

Paul G. Hoffman, Economic Cooperation Administrator, warned that while the cold war with Russia was half won the hardest part of the job remained to be accomplished. He agreed with Curtis E. Calder, chairman, Electric Bond and Share Co., that American imports should be increased to give Europeans more dollars. The ECA, Mr. Hoffman said, "is going out of business in June 1952."

Sen. John W. Bricker, R., Ohio, condemning Fair Deal policies, warned that "Big Government" is the greatest threat to American institutions today. Dr. Harold G. Moulton, president of Brookings Institute, called the last 20 years remarkable for their demonstration

of the resiliency and strength of the American economy. He observed, however, that optimism must be tempered by the danger of the rising tax burden of the social insurance program which he estimated would be paying out \$20 to \$28 billion a year by 1960. Such programs, he noted, take in more than they pay out in the early years but in time the situation is reversed.

Edward C. Gray, executive vice-president of the New York Stock Exchange, suggested that business will have trouble attracting risk capital as long as the wealthy are "too burdened with taxes to be interested in taking chances." He

Utilities Plan Record Expansion

Washington—Only one industrial group, the gas and electrical utilities, will lay out more capital for new plants and equipment during the first quarter 1950 than in 1949.

According to the latest survey by the Commerce Dept. and the Securities & Exchange Commission total industrial outlay for plants and equipment will run 14 pct below first quarter 1949. About \$3.8 billion will be so spent.

Capital outlays for 1949 are now estimated to total \$17.9 billion as compared with \$19.2 billion in 1948.

Italian Power Project Approved

Washington—A Marshall Plan project to install an additional 50,000 kw-hr of steam generating capacity at the Genoa plant of the Societa Edison in Italy has been approved.

Cost of the project is the equivalent of about \$8,400,000 including \$6,169,000 in ECA assistance



C. A. Putnam

said that the volume of liquid savings and the number of potential investors was not a problem, that if the middle income group decides to put only a small portion of savings into common stocks business will find no difficulty in obtaining risk capital.

funds for the purchase of a turbo-generator, boilers and accessory equipment for the installation.

In April, ECA approved an authorization of \$6,000,000 for a 50,000-kw addition to the same plant.

GM November Production Drops

Detroit—Production of passenger cars and trucks by General Motors divisions in the United States and Canada during November totaled 207,969 units.

The November production figure is off approximately 35,000 units as compared with October.

For the year to date, General Motors has produced 2,629,151 cars and trucks in U. S. and Canada compared with 1,986,353 for the same period last year.

Both of GM's truck divisions, Chevrolet and GMC, show a loss in production during 1949 as compared with 1948. The GM passenger car divisions have made gains ranging from 36 pct in the case of Pontiac passenger car production to a 51 pct boost in Buick output.

Viewing the News from

The ECONOMIC SIDE

By JOSEPH STAGG LAWRENCE

"Progress in Reverse"

IT is an established fact in this country that the real earnings of the wage earner have doubled approximately every 50 years. In other words, the real income of the average worker is now about eight times what it was at the end of the 19th century. This has occurred in spite of the fact that the worker now toils only two hours for every three that he worked 150 years ago.

The causes of this great improvement in the output of the worker are also reasonably clear. The worker is using better tools. Since the end of the Civil War the average equipment per worker in terms of constant dollar values has increased approximately twelvefold.

Much of this improvement is due to the investor who had the courage to buy new tools, often without the assurance that his investment would provide a fair return for his risk. Some of the credit must go to management, which has sought new techniques in the hope that more could be produced with less effort and cost. Some of the credit must also go to the worker who has accepted labor-saving machines in the knowledge that the immediate effect would be a cut in the demand for his services.

The results have paid off. They have paid off in higher real wages. They have paid off in greater leisure and less arduous toil. They have also paid off in a broad diffusion of the benefits throughout the community. This is of great importance. Greater productivity of the worker has reduced the cost of those material things by which we live. By virtue of this reduction in cost, the buying

power of all consumers has been increased.

Unfortunately, labor today is in process of repudiating this lesson in progress. Its leaders are constantly striving for higher wages and justifying their demands in general terms on the ground that higher income for the organized worker means higher consumption and, therefore, a higher level of general prosperity.

This reasoning ignores the fact that higher wages in the first instance mean higher costs. Unless offset by better technology or absorbed out of surplus earnings, such greater costs mean higher prices and reduced buying power on the part of everyone beyond the limited circle of union labor.

It ignores the fact that union labor today constitutes only a quarter of the entire working force. Union bargaining power, pressed too far and exploited too rapidly in anticipation of greater productivity, actually cuts the general demand for labor's products and invites unemployment.

Professor Faville of Stamford University points this out strikingly in a discussion of increased productivity through better technology and the rise in unit labor costs. During the last ten years productivity has gained approximately 8 pct.

"In the same period, the trend of wage costs per unit of production in manufacturing has advanced more than 13 times as fast as productivity increases, with the resultant lifting in prices at which goods must be sold."

Organized labor is thus reversing the prewar processes of progress. It is inviting trouble for itself and applying brakes to economic growth.

French Machine Tool Group Visiting Cincinnati Plants

Cincinnati—A 19-man delegation representing France's machine tool and metalworking industry, heard Walter Tangemann, executive vice-president, Cincinnati Milling Machine Co., discuss the "Development of the Machine Tool Industry in the Cincinnati Area."

Here for a 2-week study of U. S. production techniques, the group's tentative itinerary in Cincinnati included visits to Cincinnati Milling Machine Co., LeBlond Machine Tool Co., University of Cincinnati, Cincinnati Shaper Co., Avey Drilling Machine Co., and Gray Co., Covington, Ky., and American Tool Works. On Dec. 1, the group visited King Machine Tool Co. and Cincinnati Planer Co. on Dec. 2. Plants in other cities will be visited during December.

Technical discussion on U. S. techniques in the machine tool and metalworking machinery industry were held during the group's Cincinnati visit. Louis Champetier, director of the machine tool experiment station organized by the French Ministry of Industry and Commerce, is leader of the group.

Among the industrial concerns which cooperated in the production of the film were: American Airlines, Caterpillar Tractor Co., Dow Chemical Co., Ford Motor Co., General Motors Co., National Cash Register Co., New York Central System, Phillips Petroleum Co., and Shell Oil Co. In addition, cooperation was obtained from private research groups and government agencies.

Starts Operating Buffalo Plant

Buffalo—American Brake Shoe Co. has started operations in its newly-acquired plant in Vulcan St., Buffalo, which was formerly government-owned and used during the war by the Farrel-Birmingham Co., Inc.

New Factor Plans to Enter Foundry Field

Pittsburgh Mill Steel Corp. plans to re-equip two foundries purchased from GSA . . . Capital was obtained from pig iron trading last year—By JOHN ANTHONY

Philadelphia—The Crum Lynne steel foundry, bought recently by Pittsburgh Mill Steel Co., Inc., New York, is expected to be back in production in the next 30 days producing specialty castings, according to Alice Hansen, president of the family-held corporation. The foundry is in pretty fair operating shape, and its two small electric arc furnaces, recently relined, can go into production once the electrodes are replaced and the power is made available. There are two Whiting cupolas, a No. 5 and a No. 6.

The company's immediate plans for the operation of the foundry include the production of alloy and stainless steel castings. The production of magnesium treated ductile iron castings in the electric furnace is another prospect foreseen by the new management.

Owes Baltimore Plant, Too

This plant, near Eddystone, Pa., has a long history of operation as a steel castings producer under a succession of managements. Near seaboard, it was once operated as the Atlantic Steel Castings Co. More recently it was set up as an ingot producer operating as Zimira Steel Castings Co. Plant buildings occupy about five acres out of a total property of 15 acres.

The company has also purchased a Baltimore foundry which had been operated as the Baltimore Steel Castings Co. Originally a pipe foundry, it was equipped during the war as a magnesium castings producer.

This plant will require a great deal more work to put into operating condition. The management estimated that it may be three months or more before production can begin. There are two Whiting No. 9 cupolas that will be mechanized.

Immediate plans for this plant contemplate its operation as a soil pipe producer. With small home

building continuing at a furious rate throughout the country, the soil pipe market is very active. Right now there is a shortage of soil pipe production. The company already has assured orders of nearly \$1 million a year.

Profit from Pig Iron

Alice Hansen, the dominant figure in the management of the company's activities, recognizes that she is now entering a highly competitive field. Having surrounded herself with a staff of practical steel and foundry men, and calling on the technical staffs of the equipment manufacturers to guide the management in reconditioning and mechanizing operating equipment, she expects to meet this competition. With both plants located near seaboard, a wide market can be opened up based on low-cost water rates. The company will concentrate on specialty products in which the competition may not be quite as difficult for a newcomer in the field to buck.

Acquisition of the two plants

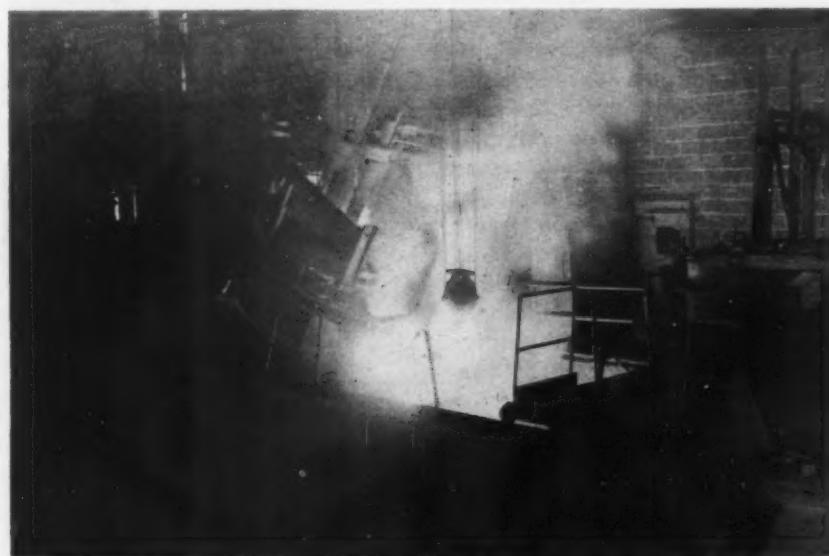
from General Services Administration at prices well below present day construction costs is also expected to hold down overhead charges. Operating with a relatively small management staff, and financed exclusively with private capital, the company expects to be in a good position to meet the competitive market.

The company's operations began with the acquisition in 1941 of a Bronx, N. Y., steel warehouse still being operated under the name of Service Steel Corp. Later on, the company marketed pig iron made in Texas by the Lone Star Steel Co. under a three year contract for 10 pct of the plant's output. The pig iron is reported to have been marketed at a \$14 a ton markup over the published Cleveland price, f.o.b. Lone Star, Texas.

Tractor Implements Shown

Detroit—More than 500 Michigan businessmen were recently shown a complete line of industrial equipment designed for use with the Ford Tractor by Great Lakes Tractor & Equipment Co., Birmingham, Mich., distributors of Ford tractors and Dearborn Farm Equipment. A 2-hr demonstration of implements designed especially for use by industrial and commercial users was held.

IN NEW HANDS: Pouring steel from the 2-ton electric furnace at Crum Lynne, Pa., foundry recently acquired by Pittsburgh Mill Steel Co. This foundry will be used primarily for specialty castings.



Alcoa, Union Views Differ on Long Strike

Company spokesman says 51-day tieup at nine plants could have been settled 3 weeks earlier . . . Union says it fought AFL pattern . . . Return to full output seen in 2 to 8 weeks.

Pittsburgh—There seemed to be some differences of opinion over what prolonged the United Steelworkers of America strike against nine plants of the Aluminum Co. of America—a strike that ended last week after 51 days.

A spokesman for the company said the walkout, which affected 16,000 employes, could have been settled at least 3 weeks earlier had the union not insisted upon injecting demands for wage increases and extra pay for holidays not worked into the negotiations. The strike began Oct. 17 over union demands for company-financed pensions and social insurance.

The USWA said that wasn't the case at all. They insisted that the company wanted them to accept what they inferred was an inferior program agreed to by the AFL Aluminum Workers at five other Alcoa plants which were not struck. At any rate, Philip Murray, USWA president, said that what his union won was "superior" to what the AFL got.

Disability Clause Differs

However, M. M. Anderson, Alcoa vice-president in charge of industrial relations, said flatly at two points in a prepared statement that the pension and social insurance program were the same as negotiated by the company with other unions. The only difference, he said, was in the disability clause where the union offered a choice, took a formula at variance with that agreed upon with other unions. "The company," he said, "was willing to permit the union to choose the provision it preferred."

The company spokesman also emphasized that the union got neither a wage increase nor concessions on pay for holidays not worked. He said the company 2

years ago offered such a program to the union but that the USWA chose to take a comparable wage increase instead.

There was even a difference of opinion over whether the union this time was demanding a wage increase or adjustment of procedure on wage rate inequities. The union called it "wage rate inequities"; the company said it amounted to a demand for a wage increase. At any rate, the company said the procedure for settlement of inequities remains the same.

Pension To Be \$100 Monthly

While the formula for arriving at pensions due retiring employees differs from that agreed to by steel companies, the pension amounts are the same—a minimum of \$100 per month, including Social Security, for workers at 65 with 25 years' continuous service, and lesser amounts for employes with fewer years of service. Mr. Anderson said the pension plan "is

not the same as the various steel settlements."

Plants affected by the strike are at Alcoa, Tenn.; New Kensington, Pa.; Bauxite, Ark.; Bridgeport, Conn.; Badin, N. C.; Richmond, Ind.; Detroit, Mich.; Mobile, Ala., and Edgewater, N. J.

The company said it would be "from 2 to 8 weeks" before full production is effected due to loss of customers who went over to other suppliers and the normal lag in getting aluminum reduction furnaces back into operation.

Fairless Warns Against Additional Business Burdens

Chicago—Benjamin F. Fairless, president of U. S. Steel Corp., sounded a warning here against killing the goose that lays the golden eggs.

That, in effect, was what Mr. Fairless told the Illinois Manufacturers Assn. in an address last Tuesday night in which he discussed the heavy financial burdens that have been imposed upon industry in the field of social welfare.

Industry, he said, is well aware of its new responsibilities, but we must be careful, he warned, against imposition of additional burdens lest we reach the breaking point that would mean hardship for everybody. Mr. Fairless made it clear, also, that he felt the time had come for industry to be helped rather than hindered.

"Present factors not helpful in the situation," he said, "are burdensome taxation, interference with production, unwarranted probing, baiting, harassment and misrepresentation, along with recurrent attempts at fanning up an atmosphere of hostility to business."

Mr. Fairless said that the situation should be reversed; that the role of industry to the national welfare—"to national survival"—should always be kept in mind. National survival, he said, "is item number one in the book of security."



"Now he claims he's allergic to fountain pen ink—he won't sign."

Appraises European Machine Tool Market

Future outlook is called good but short term prospects are dubious, says Clark, Warner & Swasey export sales manager

... Delivery time, U. S. technology favor American firms.

Cleveland—Future European sales outlook for U. S. machine tool builders is good, but short term prospects, specifically until British machine tool builders increase their prices, are dubious, Noble B. Clark, export sales manager, Warner & Swasey Co., Cleveland, told THE IRON AGE this week.

Mr. Clark, who returned recently from a 6-week appraisal of principal European machine tool markets, warned that the British machine tool industry is going to get some of the business U. S. builders had hoped to do with new customers.

Factors favoring the purchase of U. S. machine tools, despite devaluation, according to Mr. Clark, are quick deliveries, or shipment within 30 days, as compared to the British deliveries which vary from 30 days to 18 months. Also, when dollars are rationed, as they are in ECA countries, these countries buy the most important things—and U. S. machine tools are high on the list. As a third factor, the technology of many European industries has become American.

Price Works Against U. S. Firms

Chief of the factors militating against purchase of U. S. machine tools is price. British currency was actually devalued from the going commercial rate of approximately \$4.03 to \$2.80 a pound. This is approximately a 30 pct devaluation, which amounts to a 44 pct increase in the price of U. S. goods. Money in most European countries is getting tight, not only dollars but the foreign currencies as well, which provides an additional incentive to buy British.



Noble B. Clark

Another problem is export licensing with any European country which exports any industrial product behind the iron curtain. In such cases, Mr. Clark charged, the U. S. government is applying security clauses of authority and refusing export licenses.

Government Moves too Slowly

He made public a letter to the Office of International Trade, Department of Commerce, on a case involving a Warner & Swasey Co. turret lathe which has been on the loading platform boxed for export to a Swiss customer for more than 6 weeks. At the time this machine was to have been shipped, Warner & Swasey also shipped six other identical machines to the same customer, who has more than 100 of these machines in his plant.

Pointing out that a similar machine, as far as specifications are

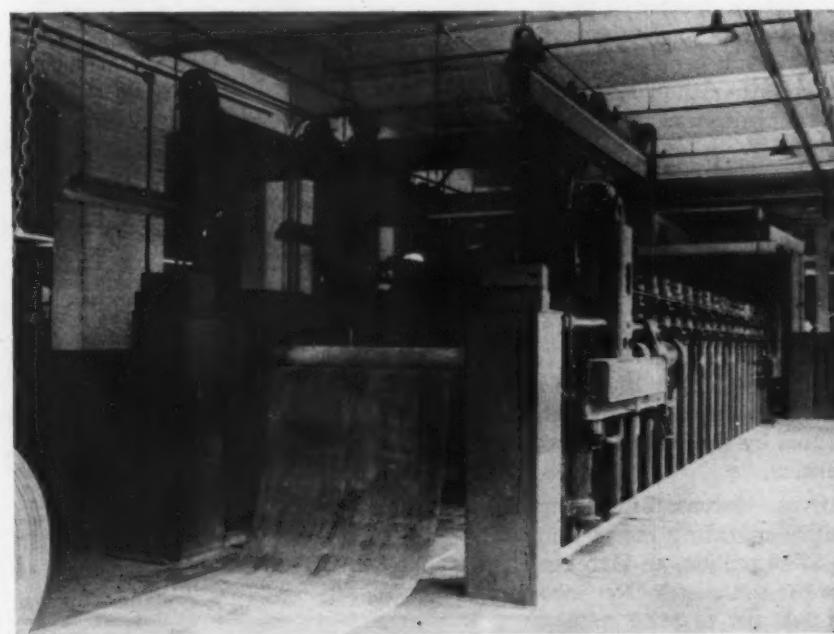
concerned, can be purchased from Alfred Herbert Co., Coventry, England, without any restrictions, Mr. Clark added that such difficulties concerning export licenses will certainly decide the case in favor of their competitors.

"We are just as interested in security as any other good American, but we feel that sound judgment must be applied and applied quickly to cases such as this," Mr. Clark declared.

He also called attention to a case involving a Swedish customer in which the export license was withheld for more than 8 months. During this period company representatives made three trips to Washington, many telephone calls and incurred other similar expenses. When the decision was made to permit export of the machines, devaluation had taken place and the Warner & Swasey Co. representatives made a trip to Sweden to persuade them in the matter.

Mr. Clark predicted that first quarter European sales volume would be good, primarily because old customers, whose production

MECHANIZATION: Shown is one of the world's largest hydraulic presses for conveyor belts which has recently been put into successful operation at the Passaic, N. J., factory of Manhattan Rubber Div., Raybestos-Manhattan, Inc. Built to Manhattan Rubber's specifications by The Baldwin Locomotive Works, the press will vulcanize conveyor belts under controlled pressure and temperature. A system of temperature and pressure controls maintains a uniform condition on each platen of the huge press.



is based on U. S. machines, place orders in January.

Also, machine tool order volume in Italy is promising and possibly the best potential market in Europe. Germany wants U. S. equipment, he said, but added that the money shortage there was particularly acute. Two programs, one for railroads and the other automotive, in Yugoslavia, will result in some orders.

According to Mr. Clark, it is still too soon to find out how much devaluation will increase British exports, which must increase 44 pct if the British are to break even. British machine tool companies are already working at full capacity, making a 44 pct increase difficult, if not impossible.

U. S. Machine Tools Cost More

The Swedish kroner is pegged to the pound and as a result, U. S. machine tools now cost 44 pct more in Sweden. By law, Swedes are not permitted to buy dollars to cover an order when it is placed. They must pay the rate for the dollar that exists when the goods arrive. Therefore, machine tools and other equipment on order were increased 44 pct.

Mr. Clark said Denmark as a market has been practically eliminated by devaluation. Belgium has been a bright spot, but has "over-exported." That is, they cannot obtain payment except from soft currency countries, because the Belgian economy has a dollar basis rather than a sterling basis and devaluation there was only 12 pct.

Power Revenue Increases

Washington—Electric operating revenues of the larger privately-owned electric utilities in the United States in October 1949 were \$362.1 million as compared to \$357.2 million in October 1948, as increase of 1.4 pct, according to preliminary figures by the Federal Power Commission.

Gross income, including other utility operating income, amounted to \$76.5 million, an increase of 12.4 pct for the month. Net income was up 14.5 pct to \$54.7 million.

Construction Steel News

Fabricated steel awards this week included the following:

- 2615 Tons, Hudson, Wis., bridge over the St. Croix River, last week Allied Structural Steel Co., Chicago, reported low bidder, contract has been awarded to this company.
- 2190 Tons, Cook County, Ill., bridge No. 42F-11, American Bridge Co., Pittsburgh, low bidder.
- 1400 Tons, Tampa, Fla., plant for Florida Power Corp., to O'Neal Steel Co., Birmingham.
- 1100 Tons, Bartholomew, Ind., state highway bridge 3136 to Bethlehem Steel Co., Pittsburgh.
- 695 Tons, Cook County, Ill., bridge 42VF-12, American Bridge Co., Pittsburgh, low bidder.
- 650 Tons, Cook County, Ill., state highway bridges 0404-12-HF and 0405-1, American Bridge Co., Pittsburgh, low bidder.
- 425 Tons, Queenstown, Md., Maryland State Roads Commission, general contract to McLean Contracting Co., Baltimore.
- 425 Tons, Jenkintown, Pa., Standard Pressed Steel Co., building No. 54, to Bethlehem Contracting Co., Bethlehem.
- 415 Tons, Cook County, Ill., bridge section 42VF-10, American Bridge Co., Pittsburgh, low bidder.
- 335 Tons, Cook County, Ill., bridge section 0304-1-HF, American Bridge Co., Pittsburgh, low bidder.
- 330 Tons, Cook County, Ill., Simpson bridge on Eden Parkway to American Bridge Co., Pittsburgh.
- 275 Tons, Chicago, factory building for Formfit Co., to Wendagle & Co., Chicago.
- 240 Tons, Cook County, Ill., bridge section 0404-1-HF, American Bridge Co., Pittsburgh, low bidder.
- 225 Tons, Cook County, Ill., Eden Highway bridge No. 26308-08-1SD to American Bridge Co., Pittsburgh.
- 170 Tons, Will County, Ill., bridge section 9F and 9VF, American Bridge Co., Pittsburgh, low bidder.
- 160 Tons, Scranton, Pa., Catholic Youth Center, through John Gibon Construction Co., Philadelphia, to Truscon Steel Co., Youngstown.
- 150 Tons, Birmingham, addition for Virginia Steel Co., to O'Neal Steel Co., Birmingham.
- 150 Tons, Galesburg, Ill., athletic building at Knox College to J. L. Simmons Co., Chicago.
- 140 Tons, Cook County, Ill., state highway bridge section 263-12-12-15 D to American Bridge Co., Pittsburgh.
- 100 Tons, Michigan City, Ind., power house for Northern Indiana Public Service Co., to J. T. Ryerson & Sons, Chicago.

Fabricated steel inquiries this week included the following:

- 2700 Tons, Chicago, apartment building 860 Lake Shore Drive, all steel construction.
- 1870 Tons, Oakland, Calif., bridge across San Leandro Creek and S.P.R.R. tracks, California Div. of Highways, Sacramento, Calif., bids to Jan. 4, 1950.
- 6600 Tons, Annapolis, Md., bridge over Severn River, Maryland State Roads Commission, due Dec. 20.
- 2000 Tons, Benedict, Md., bridge over the Patuxent River, Maryland State Roads Commission, due Dec. 20.
- 1100 Tons, Portsmouth, Va., bridge over the Elizabeth River, Virginia Dept. of Highways, due Dec. 20.
- 1050 Tons, Westmoreland County, Pa., Pennsylvania Turnpike Authority, 31(b), due Jan. 4.
- 630 Tons, Leominster, Mass., bituminous macadam road including two steel stringer bridges, one deck girder bridge and one pedestrian overpass.
- 355 Tons, Westmoreland County, Pa., Pennsylvania Turnpike Authority, 31(e), due Jan. 4.
- 350 Tons, West Haven, Conn., Veterans Administration hospital, due Jan. 4.
- 290 Tons, Easton, Pa., "I" beam bridge, Pennsylvania Dept. of Highways, due Dec. 21.

- 213 Tons, Union County, N. J., New Jersey Turnpike Authority, due Dec. 20.
- 200 Tons, Columbus, Ohio, repairs to engine house roof, Pennsylvania Railroad, due Dec. 22.
- 160 Tons, Waymart, Pa., subcircular building, General State Authority of Pennsylvania, due Dec. 21.
- 120 Tons, Crestline, Ohio, repairs to engine house roof, Pennsylvania Railroad, due Dec. 22.

Reinforcing bar awards this week included the following:

- 2250 Tons, Riverdale Junction, N. D., through U. S. Engineers, Garrison Dam project, U. S. Steel Supply Co., low bidder.
- 250 Tons, Cook County, Ill., highway bridge 42B-11 Great Lakes Dredge & Dock Co., Chicago, low bidder.
- 200 Tons, Salem County, N. J., memorial hospital, Tom Costanza Contracting Co., Camden, N. J., low bidder on general contract.
- 195 Tons, Chicago, apartment building 5412 N. Sheridan Rd., to J. T. Ryerson & Son, Chicago.
- 190 Tons, Cook County, Ill., state highway bridge 42VB-12, Strandberg & Son Co., Chicago, low bidder.
- 130 Tons, Chicago, store building for J. M. Smythe Co., has been abandoned.
- 125 Tons, Cook County, Ill., state highway bridge 42VB-10, Strandberg & Son Co., Chicago, low bidder.
- 100 Tons, Fremont, Minn., Lincoln School building to Husted Co.

Reinforcing bar inquiries this week included the following:

- 1435 Tons, Firebaugh, Calif., structures, Delta-Mendota canal, Bureau of Reclamation, Tracy, Spec. 2857, bids to Jan. 5, 1950.
- 635 Tons, Fort Collins, Colo., structures, Poudre Supply canal, Bureau of Reclamation, Denver, Spec. 2853, bids to Jan. 4, 1950.
- 500 Tons, Lamont, Ill., Argonne Laboratory building.
- 395 Tons, Oakland, Calif., bridge across San Leandro Creek and S.P.R.R. tracks, California Div. of Highways, Sacramento, Calif., bids to Jan. 4, 1950.
- 245 Tons, Leominster, Mass., bituminous macadam road, including two steel stringer bridges, one deck girder bridge and one pedestrian overpass. Completion date, Dec. 1, 1950. Martin J. Dalton, Worcester, Mass., district engineer.

Steel piling inquiries this week included the following:

- 165 Tons, Firebaugh, Calif., structures, Delta-Mendota canal, Bureau of Reclamation, Tracy, Spec. 2857, bids to Jan. 5, 1950.

Railroad awards and inquiries this week included the following:

- The Burlington Railroad is considering building in their own shops in 1950, 3000 freight cars. Union Pacific has ordered 24,600 net tons of rails and track accessories from the Carnegie Illinois Steel Corp., Pittsburgh. This is for delivery in 1950 but does not represent the total requirements. The same company is expected to order 5000 freight cars by mid-December and to reinstate their car rebuilding program on 1469 gondolas and will reline 1000 old wood gondolas with steel.

AEC Offers Uranium Metal

Washington—Need some uranium metal? The Atomic Energy Commission has authorized Mallinckrodt Chemical Works of St. Louis to produce 200 lb in rod form for sale at about \$50 per lb.

Briefs and Bulletins

In reply—Officials of the A. M. Byers Co., Pittsburgh, charge that a New York group making "a second attempt to seize control" of the company misrepresented the facts in a letter of solicitation to stockholders. The officials said the misstatements concerned charges that nine directors of the company control only 1775 shares of stock; that the company has failed to aggressively solicit business, and that too much of the company earnings have been retained in the business. The company cited facts to refute these allegations and charged in return that this was just another effort to take over the company. The New York group is headed by Dr. Louis Cohen and John S. Kroese.

strong demand—Steel demand in the Midwest is showing very good strength, especially in flat-rolled products. Carbon bars are also tight, particularly smaller sizes. Cold drawers are taking all the rod tonnage they can get, and light forgers are after the mills constantly for more tonnage. Nobody can get all the plates and shapes they want from now to the end of the first quarter. But schedules aren't too crowded after that. Even now the mills have enough leeway in these two items to shove in and roll a little additional tonnage for their good customers that happen to be on the spot.

quotas lifted—No quantitative quotas will be imposed on exports of galvanized iron and steel sheets beginning with first quarter 1950. Under new open-end provisions, which apply to both prime and reject sheets, license applications covering first quarter shipments may be filed with OIT at any time. Also removed is the requirement that letters of availability and certifications of orders must be submitted with license applications.

freight cars—Domestic freight car deliveries during November totaled 4376, according to the American Railway Car Institute. October production was 4532 cars. Orders during November totaled 1145. The backlog of orders as of Dec. 1 was 14,146. This compares with 17,377 on Nov. 1 and 106,405 on Dec. 1, 1948.

few complaints—In recent weeks there have been surprisingly few complaints about steel quality. This is believed to be due to the tightening of the market as a result of the strike. Some buyers say they have sent out word to overlook for the time being everything but the most glaring deficiencies.

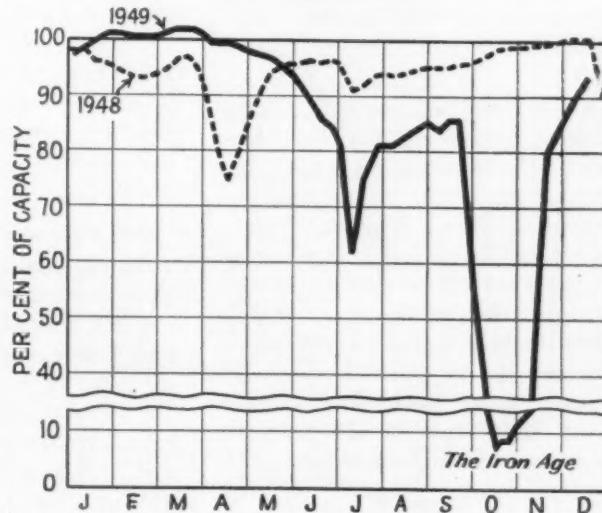
steel price boosts—Mahoning Valley Steel Co. has advanced prices \$10 a ton. Hot-rolled sheets, 19 gage and lighter are now \$4.65 per 100 lb; 18 gage and heavier are \$3.75. Enameling sheets were increased to \$4.90. Field, armature and electrical grade silicon sheets are now \$5.65, \$5.95 and \$6.45 respectively.

blown in—Ending a 6-month shutdown for relining and overhauling, No. 2 blast furnace at the Midland, Pa., plant of Crucible Steel Co., was blown in Dec. 4, raising pig iron production at the plant to full capacity of 42,000 tons per month. Cost of rebuilding was approximately \$700,000.

transfer—Weirton Steel Co. has transferred its tin house from Weirton, W. Va., to the Steubenville plant to provide an expansion of the electrolytic line. The plant payroll at Steubenville will be increased by 600 men to a total of 1100.

good news—The American Society of Tool Engineers has just completed a national survey of projected 1950 purchases of new machine tools, machine tool accessories and materials handling equipment. Of the companies reporting, 80 pct state that they plan to buy either more equipment or the same amount as in 1949.

Steel Operations



District Operating Rates—Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
Dec 4	94.0*	97.0*	79.5*	85.0	104.0	106.0	103.0	103.0	101.0*	94.0	85.5	91.5	112.5	92.0
Dec 11	95.0	98.0	81.0	85.0	107.0	103.5	106.0	103.0	101.0	92.0	89.0	91.5	98.5	94.0

* Revised.

Nonferrous METALS OUTLOOK

Market Activities

Copper scrap price advance $\frac{1}{4}$ c . . . Producers' copper inventories reduced . . . Lead market shows improvement . . . Tin cut another 2c by RFC.



by

John Anthony

New York—Refineries buying prices for copper scrap advanced $\frac{1}{4}$ c per lb last week, an indication of the underlying strength of the primary copper market. This brings the price of No. 1 heavy copper to 15.00¢, No. 2 to 14.00¢, and light copper to 13.00¢. Refineries are getting very little No. 1 at this price as most of it is going to the brass mills who are buying at $15\frac{1}{2}$ c plus another cent premium for lots of more than 20 tons.

Observers believe that under present cost conditions No. 1 copper at 15.25¢ would be the equivalent of the 18.50¢ primary copper price, delivered Valley. Therefore there is no immediate threat of pressure being exerted by the scrap market on the price of primary metal. But an increase of another $\frac{1}{2}$ c to 1¢ in the price of copper scrap would undoubtedly make itself felt in the primary market, especially considering the current heavy demand for the metal.

Copper Market Strong

It is freely predicted in the trade that the November deliveries figure will be in excess of 110,000 tons. Sales for December shipment were 87,000 tons by Dec. 8, which indicates that this month will also exceed 100,000

NONFERROUS METALS PRICES

	Dec. 7	Dec. 8	Dec. 9	Dec. 10	Dec. 12	Dec. 13
Copper, electro, Conn. . .	18.50	18.50	18.50	18.50	18.50	18.50
Copper, Lake, Conn. . .	18.625	18.625	18.625	18.625	18.625	18.625
Tin, Straits, New York . . .	81.00	79.00	79.00	79.00	79.00	79.00
Zinc, East St. Louis . . .	9.75	9.75	9.75	9.75	9.75	9.75
Lead, St. Louis . . .	11.80	11.80	11.80	11.80	11.80	11.80

Note: Quotations are going prices.

tons. With these deliveries, and crude and refined copper production rising very slowly, there will be another important reduction in producers' inventories in November, and probably again in December.

Lead Discounts Lower

There has been a definite improvement in the lead market. Immarket ported lead offerings to consumers early last week at a discount of as much as $5\frac{1}{2}$ c from the domestic market were being offered around the New York area for 11.90¢, a maximum discount of $1\frac{1}{2}$ c. With this background, it is conceivable that the lead market might well stiffen up, which would bring about an immediate increase in prices.

Reports from the trade indicate that the Prime Western zinc market is holding its own. The long drawn out strike at the Palmerston, Pa., plant of one producer

of Special High Grade, and reduced operations following the end of the strike at Kellogg, Idaho, have kept this grade in very short supply.

Laurel Hill Negotiations

It is learned that negotiations were under way at the Laurel Hill refinery of Phelps Dodge early this week. The outcome will probably not be known for a week. But if this plant should be struck, it would have an important effect on the copper market.

The price of tin was reduced another 2c per lb by RFC last week, bringing down the price of spot to 79¢. This figure reflects a drop of 24¢ in the price of tin in the short period since the market was opened up for imports by consumers and dealers in September. The repeated reductions in the price have scared consumers away from the market.

Mill Products**Aluminum**

(Base prices, cents per pound, base 30,000 lb, f.o.b. shipping point, freight allowed)

Flat Sheet: 0.188 in., 28, 38, 28¢; 48, 61¢; 28¢; 52S-O, 30¢; 24S-O, 24S-OAL, 29¢; 75S-O, 75S-OAL, 36¢; 0.081 in., 28, 48, 27¢; 4S, 61S-O, 30¢; 52S, 32¢; 24S-O, 24S-OAL, 30¢; 75S-O, 75S-OAL, 38¢; 0.032 in., 28, 38, 29¢; 48, 61S-O, 33¢; 52S, 36¢; 24S-O, 24S-OAL, 37¢; 75S-O, 75S-OAL, 47¢.

Plate: 1/4 in. and heavier; 28, 38, F, 28¢; 48-F, 28¢; 52S-F, 27¢; 61S-O, 26¢; 24S-F, 24S-FAL, 27¢; 75S-F, 75S-FAL, 33¢.

Extruded Solid Shapes: Shape factors 1 to 4, 23.6¢ to 64¢; 11 to 13, 34.6¢ to 76¢; 23 to 25, 36.7¢ to \$1.05; 35 to 37, 44¢ to \$1.53; 47 to 49, 63.5¢ to \$2.20.

Rod, Rolled: 1.5 to 4.5 in., 28-F, 38-F, 34¢ to 30¢; Cold-finished, 0.375 to 3 in., 28, 38, 36.5¢ to 32¢.

Screw Machine Stock: Drawn, 1/4 to 11/32 in., 11S-T3, R317-T4, 49¢ to 86¢; cold-finished, 1/4 to 1 1/2 in., 11S-T3, 37.5¢ to 35.5¢; 1/2 to 2 in., R317-T4, 37.5¢ to 84.5¢; rolled, 1 1/16 to 2 in., 11S-T3, 35.5¢ to 32.5¢; 2 1/2 to 3 1/2 in., R317-T4, 38.5¢ to 32.5¢. Base 5000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in.: 28, 36¢ to 26.5¢; 52S, 44¢ to 32¢; 56S, 47¢ to 38.5¢; 17S-T4, 50¢ to 34.5¢; 61S-T4, 44.5¢ to 34¢; 75S-T6, 76¢ to 55¢.

Magnesium

(Cents per lb, f.o.b. mill, freight allowed
Base quantity 30,000 lb)

Sheets and Plate: Ma, F8a, 1/4 in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 12, 63¢-65¢; 14, 69¢-74¢; 16, 76¢-81¢; 18, 84¢-89¢; 20, 96¢-1.01; 22, \$1.22-\$1.31; 24, \$1.62-\$1.75. Specification grade higher.

Extruded Round Rod: M, diam in., 1/4 to 0.811, 58¢; 1/2 to 1/4, 46¢; 1/4 to 1.749, 48¢; 9/16 to 5, 41¢. Other alloys higher.

Extruded Square, Hex. Bar: M, size across flats, in., 1/4 to 0.811, 61¢; 1/2 to 0.749, 48¢; 1/4 to 1.749, 44¢; 2 1/2 to 4, 42¢. Other alloys higher.

Extruded Solid Shapes, Rectangle: M, in weight per ft, for parameters of less than size indicated, 0.10 to 0.11 lb per ft, per. up to 2.5 in., 55¢; 0.22 to 0.26 lb per ft, per. up to 5.9 in., 51¢; 0.50 to 0.59 lb per ft, per. up to 8.6 in., 47¢; 1.8 to 2.59 lb per ft, per. up to 19.5 in., 44¢; 4 to 6 lb per ft, per. up to 28 in., 48¢. Other alloys higher.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.067, 1/4 to 5/16, 31.14; 5/16 to 1/2, 31.02; 1/2 to 5/8, 76¢; 1 to 2 in., 65¢; 0.065 to 0.082, 1/2 to 7/16, 85¢; 1/2 to 5/8, 82¢; 1 to 2 in., 57¢; 0.165 to 0.219, 5/8 to 3/4, 54.5¢; 1 to 2 in., 83¢; 3 to 4 in., 49¢. Other alloys higher.

Nickel and Monel

(Base prices, cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	60	47
Strip, cold-rolled	66	50
Rods and bars	56	45
Angles, hot-rolled	56	45
Plates	58	46
Seamless tubes	89	80
Shot and blocks	40	

Copper, Brass, Bronze

(Cents per lb, freight prepaid on 200 lb)

	Sheets	Rods	Extruded Shapes
Copper	32.18	28.03	31.78
Copper, h-r	...	29.28	...
Copper, drawn	...	29.81	33.03*
Low brass	30.12	30.29	31.70*
Yellow brass	28.69	28.38	31.51*
Red brass	30.60	30.29	33.51*
Naval brass	33.51	27.57	28.82
Leaded brass	23.19	27.22	27.22
Com'l bronze	31.61	31.30	34.27*
Manganese bronze	37.01	30.92	32.42
Phosphor bronze	50.90	51.15	...
Munts metal	31.58	27.14	28.39
Everdur, Hercoyloy, Olym-pic, etc.	37.19	36.14	...
Nickel silver, 10 pct	39.66	41.87	46.80
Arch. bronze	...	...	27.22

*Seamless tubing.

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99 + %, 10,000 lb, freight allowed	17.00
Aluminum pig	16.00
Antimony, American, Laredo, Tex.	32.00
Beryllium copper, 3.75-4.25% Be dollars per lb contained Be	\$24.50
per lb contained Be	\$52.00
Bismuth, ton lots	32.00
Cadmium, del'd	32.00
Cobalt, 97.98% (per lb)	\$1.80 to \$1.87
Copper, electro, Conn. Valley	18.50
Copper, lake, Conn. Valley	18.625
Gold, U. S. Treas., dollars per oz.	\$2.25
Iridium, dollars per troy oz.	\$100 to \$110
Lead, St. Louis	11.80
Lead, New York	12.00
Magnesium, 99.8 + % f.o.b. Freeport, Tex.	30.50
Magnesium, sticks, carlots	33.50
Mercury, dollars per 76-lb flask	
No. 1 copper wire	15.00
No. 2 copper wire	14.00
Light copper	13.00
Refinery brass	13.00*
Radiators	8.75-9.00

Scrap Metals**Brass Mill Scrap**

(Cents per pound; add 1/2¢ per lb for shipments of 20,000 to 40,000 lb; add 1¢ for more than 40,000 lb)

Turnings	Heavy	Ings
Copper	15 1/2	14 1/2
Yellow brass	12 1/2	11 1/2
Red brass	14	13 1/2
Commercial bronze	14 1/2	13 1/2
Manganese bronze	12	11 1/2
Leaded brass rod ends	12 1/2	...

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper wire	15.00
No. 2 copper wire	14.00
Light copper	13.00
Refinery brass	13.00*
Radiators	8.75-9.00

*Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer)

No. 1 copper wire	15.00
No. 2 copper wire	14.00
Light copper	13.00
No. 1 composition	12.00-12.25
No. 1 comp. turnings	11.50-11.75
Rolled brass	10.00
Brass pipe	10.50
Radiators	9.00-9.50
Heavy yellow brass	9.00

Aluminum

Mixed old east	10.00-10.50
Mixed old clips	10.00-10.50
Mixed turnings, dry	8.50-9.00
Pots and pans	10.00-10.50

Low copper 11.50-12.00 |

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	13 1/2-13 1/2
No. 2 heavy copper and wire	12 1/2-12 1/2
Light copper	11 1/2-11 1/2
Auto radiators (unsweated)	8 - 8 1/2
No. 1 composition	10 1/2-10 1/2
No. 1 composition turnings	10 - 10 1/2
Clean red car boxes	8 1/2 - 9
Cocks and faucets	8 1/2 - 9
Mixed heavy yellow brass	6 1/2 - 7
Old rolled brass	8 - 8 1/2
Brass pipe	8 1/2 - 9
New soft brass clippings	10 1/2-11
Brass rod ends	9 1/2-10
No. 1 brass rod turnings	9 1/2 - 9 1/2

Aluminum

Alum. pistons and struts	4 1/2 - 5
Aluminum crankcases	7 1/2 - 8
2S aluminum clippings	10 1/2-11
Old sheet and utensils	7 1/2 - 8
Borings and turnings	4 - 4
Misc. cast aluminum	7 1/2 - 8
Dural clips (24S)	7 1/2 - 8

Zinc

New zinc clippings	6 - 6 1/2
Old zinc	4 - 4 1/2
Zinc routings	2 1/2 - 3
Old die cast scrap	3 1/4 - 3 1/2

Nickel and Monel

Pure nickel clippings	21 - 23
Clean nickel turnings	14 - 15
Nickel anodes	20 - 22
Nickel rod ends	20 - 22
New Monel clippings	12 - 14
Clean Monel turnings	8 - 9
Old sheet Monel	10 - 12
Old Monel castings	9 - 10
Inconel clippings	11 - 13
Nickel silver clippings, mixed	8 - 10
Nickel silver turnings, mixed	6 - 7

Lead

Soft scrap, lead	9 - 9 1/2
Battery plates (dry)	4 1/2 - 4 1/2

Magnesium

Segregated solids	9 - 10
Castings	5 1/2 - 6 1/2

Miscellaneous

Block tin	60 - 62
No. 1 pewter	38 - 40
No. 1 auto babbitt	35 - 37
Mixed common babbitt	9 - 9 1/2
Solder joints	11 1/2 - 12
Siphon tops	40 - 42
Small foundry type	11 1/2 - 12
Monotype	10 1/2 - 11
Lino. and stereotype	9 1/2 - 10 1/2
Electrotype	8 1/2 - 9 1/2
New type shell cuttings	11 1/2 - 11 1/2
Hand picked type shells	4 - 4 1/2
Lino. and stereo. dress	4 1/2 - 5
Electro. dress	2 1/2 - 3



SCRAP

Iron & Steel

Market Hit by Decreased Consumer Demand

Further price weaknesses were in evidence this week in most of the major markets. The future trend of the market is still uncertain and trade sources do not expect much until another buying movement firms prices. Prospects for consumer buying are rather dim for the remainder of this year, and it is expected that it will be mid-January before the mills will again enter the market for large tonnages. Dealers are not storing incoming material and some have liquidated most of their accumulated holdings. Brokers report that they are having no difficulty in filling their old commitments at quoted prices. The demand for cast has subsided and this is reflected in lower quotations for many of these items. This week the top quotation of No. 1 steel is down \$1.00 in Pittsburgh, Chicago, Youngstown, Cleveland and New York; and in Cincinnati, St. Louis and Boston it was off 50¢. This week THE IRON AGE scrap composite is off 67¢ to \$27.25 per gross ton.

PITTSBURGH — The market turned downward again this week. No. 1 heavy melting was off \$1.00 on the basis of a sale, and the undertone continued weak.

The downward trend reflected determination of consumers to resist asking prices, and evidently they were in a position to do so. Most mills were reported to have ample inventory, and one consumer has held up shipments to alleviate a temporary jam at its yards. No. 2 heavy melting and No. 2 bundles were off \$2.00, and machine shop turnings were off \$1.00.

CHICAGO—Prices dropped again here on a very slow market. Railroad specialties and foundry scrap weakened more than openhearth grades. Dealers and brokers dropped their offering prices in anticipation of a continued weak market from now till mid-January. Mills continued to restrict shipments on old orders in most items and new orders generally are being parceled out in 500 ton lots.

PHILADELPHIA—The scrap market is very quiet here. A few small tonnage orders were placed at previous quotations. Bundles are not being bought. Mixed turnings are moving to Sparrows Point. The low phos market is very quiet. The cast market is unchanged, but not quite as firm as it was. No. 1 scrap is not overplentiful as it does not pay most dealers to segregate it at the \$1.50 differential. Although some dealers are expecting consumers to begin placing heavier tonnage, it begins to appear that mills in this district are not overconfident about next year's steel production levels.

NEW YORK—A definitely weaker tendency existed in the market here. Prices were on the downside with the top quotation of No. 1 steel off \$1.00. There was some business but not enough to maintain the prices of the previous week. Some shipments out of this area have been held up due to a jam at a consumer's yard.

The cast grades are off and at present there is very little demand for some of these items.

DETROIT — The Detroit market is rather quiet this week. Open buying by mills have ended for the present and the prospects for another active market before the end of the year appear to be dim. According to trade sources, dealers have apparently liquidated most of their accumulated holdings. January factory lists are beginning to come out because of the holidays. Present indications are that the tonnage involved may double the December lists, which it now appears will be met by most auto plants as originally scheduled.

CLEVELAND—Undertone of the scrap market here and in the Valley was weaker this week as prospects of mill buying before next year were fading fast. Dealers with big tonnages are gambling that mills will move in early in January but in the interim, it is likely that only odd-lot tonnages will move. On the basis of broker offers to sell certain limited tonnages of openhearth grades, primarily No. 1 and No. 2 steel at \$1.00 to \$1.50 off last week's prices, No. 1 heavy melting at Cleveland is quotable this week at \$29.50.

BOSTON—The market here is down for the third week. No. 1 heavy melting is off another 50¢, and is being quoted at \$19.50 to \$20.00. Activity is still good and will remain so until all old commitments are filled. Some uncertainty exists and the trade does not know what to expect of the future. The cast market remains the same with no price changes.

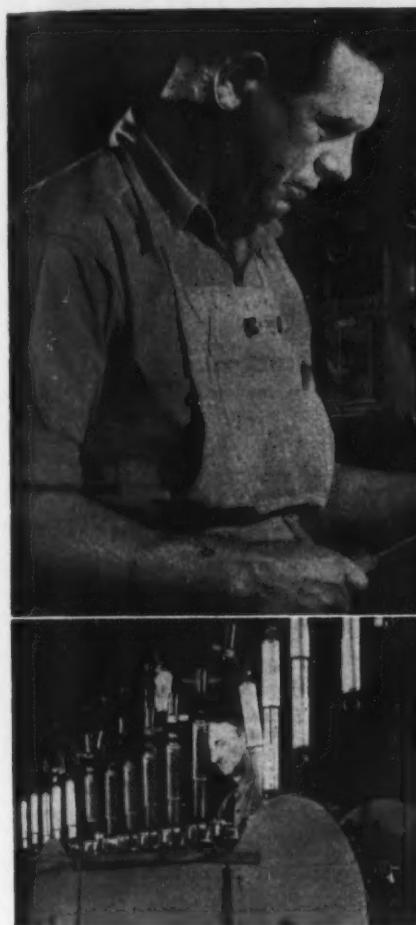
BUFFALO—Steady to slightly easier tendencies prevail in the scrap market. Mixed feelings are apparent over future price trends, but current ranges are unchanged in the absence of new business. The major factor in the local market appears to be the softer tone noticed in outside markets. However, it is pointed out also that the market here did not move ahead as rapidly as markets elsewhere in the period immediately following the strike.

CINCINNATI—A weak and inactive scrap market prevailed here this week. Only tonnage moving was sold 30-40 days ago and prospects of buying by district consumers before January are considered remote. Dealers' desire to sell is growing and consumers are becoming more quality conscious. Foundries are buying a little tonnage, at the dictates of their requirements. Prices dropped this week on the basis of broker offers, and the downward price spiral is expected to continue until another movement firms the market.

BIRMINGHAM—Trading in this market is extremely light. No openhearth grades are being bought and prices are nominal. No. 1 cast and blast furnace grades are moving but only in limited tonnages. No material of any grade is going out of this district to northern points.

ST. LOUIS—Steel mills are out of the market because of previous heavy commitments until about the middle of January and there is a lack of new buying. Brokers and dealers have been able to cover on short orders, and shipments from the country have been heavy, as are offerings from other markets. The result is that prices are lower on some items.

**Houdaille-Hershey makes
better shock absorbers at lower cost with
J&L free-machining ELECTRICWELD STEEL TUBING**



(Above) Multiple spindle broaching machine at the Houdaille Engineering Division of Houdaille-Hershey Corporation that machines the inside diameter of J&L ELECTRICWELD Tubing to $1/1000$ " tolerance.

(Left) Aeroplane-type shock absorbers on the production line at the Houdaille Engineering Division, Houdaille-Hershey Corporation, Buffalo, N. Y.



When production runs into thousands of units daily, every possible saving in material and labor costs in each shock absorber is vital to efficient manufacturing. Houdaille-Hershey Corporation, Buffalo, New York, reduced manufacturing costs when it changed from more expensive cold-drawn tubing to J&L free-machining ELECTRICWELD Tubing for the main cylinder of precision-built hydraulic shock absorbers.

This special J&L tubing is made from resulphurized, open-hearth steel. The resulphurizing imparts the de-

sired free-machining quality required by Houdaille-Hershey for broaching the interior surface of the cylinders with uniform precision to a tolerance of $1/1000$ of an inch.

Because J&L controls every step in the manufacture of ELECTRICWELD Tubing from raw materials to finished product, it can give you the exact grade of steel you need to help you make a better product, faster, and at a lower cost.

If you use tubing in the manufacture of your product investigate J&L ELECTRICWELD Tubing. Write today

for your copy of our new booklet:
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more strength with less weight."

Jones & Laughlin Steel Corporation
403 Jones & Laughlin Building
Pittsburgh 19, Pa.

Please send me your booklet: "J&L
ELECTRICWELD TUBING for more
strength with less weight."

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From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLLOY and JALLOT (hi-tensile steels).

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

Pittsburgh

No. 1 hvy. melting	\$30.50 to \$31.00
No. 2 hvy. melting	27.50 to 28.00
No. 1 bundles	30.50 to 31.00
No. 2 bundles	25.50 to 26.00
Machine shop turn.	21.50 to 22.00
Mixed bor. and ms. turns.	21.50 to 22.00
Shoveling turnings	25.50 to 26.00
Cast iron borings	24.50 to 25.00
Low phos. plate	34.50 to 35.00
Heavy turnings	26.00 to 27.00
No. 1 RR. hvy. melting	33.50 to 34.00
Scrap rails, random lgth.	36.00 to 37.00
Rails 2 ft and under	40.00 to 41.00
RR. steel wheels	35.00 to 36.00
RR. spring steel	35.00 to 36.00
RR. couplers and knuckles	35.00 to 36.00
No. 1 machinery cast	39.00 to 40.00
Mixed yard cast	36.00 to 37.00
Heavy breakable cast	30.00 to 31.00
Malleable	33.00 to 34.00

Chicago

No. 1 hvy. melting	\$26.00 to \$27.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 factory bundles	26.00 to 27.00
No. 1 dealers' bundles	24.00 to 25.00
No. 2 dealers' bundles	22.00 to 23.00
Machine shop turn.	17.00 to 18.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	18.00 to 20.00
Cast iron borings	17.00 to 18.00
Low phos. forge crops	31.00 to 32.00
Low phos. plate	29.50 to 30.50
No. 1 RR. hvy. melting	29.00 to 30.00
Scrap rails, random lgth.	36.00 to 37.00
Rerolling rails	40.00 to 41.00
Rails 2 ft and under	39.00 to 40.00
Locomotive tires, cut	32.00 to 33.00
Cut bolsters & side frames	31.00 to 32.00
Angles and splice bars	31.00 to 32.00
RR. steel car axles	40.00 to 41.00
No. 3 steel wheels	32.00 to 33.00
RR. couples and knuckles	32.00 to 33.00
No. 1 machinery cast	39.00 to 40.00
No. 1 agricul. cast	38.00 to 39.00
Heavy breakable cast	32.00 to 33.00
RR. grate bars	26.00 to 27.00
Cast iron brake shoes	30.00 to 31.00
Cast iron car wheels	36.00 to 37.00
Malleable	36.00 to 37.00

Philadelphia

No. 1 hvy. melting	\$24.00 to \$25.00
No. 2 hvy. melting	22.50 to 23.50
No. 1 bundles	24.00 to 25.00
No. 2 bundles	20.50 to 21.50
Machine shop turn.	16.50 to 17.50
Mixed bor. and turn.	14.50 to 15.50
Shoveling turnings	17.50 to 18.50
Low phos. punchings, plate	27.50 to 28.50
Low phos. 5 ft and under	26.00 to 27.00
Low phos. bundles	26.00 to 27.00
Hvy. axle forge turn.	24.00 to 25.00
Clean cast chem. borings	28.00 to 29.00
RR. steel wheels	29.00 to 29.50
RR. spring steel	29.00 to 29.50
Rails 18 in. and under	38.00 to 40.00
No. 1 machinery cast	37.00 to 39.00
Mixed yard cast	35.00 to 36.00
Heavy breakable cast	34.00 to 35.00
Cast iron carwheels	37.00 to 38.00
Malleable	36.00 to 37.00

Cleveland

No. 1 hvy. melting	\$29.00 to \$29.50
No. 2 hvy. melting	27.00 to 27.50
No. 1 busheling	29.00 to 29.50
No. 1 bundles	29.00 to 29.50
No. 2 bundles	23.50 to 24.00
Machine shop turn.	18.00 to 18.50
Mixed bor. and turn.	19.50 to 20.00
Shoveling turnings	19.50 to 20.00
Cast iron borings	19.50 to 20.00
Low phos. 2 ft and under	30.00 to 30.50
Steel axle turn.	28.00 to 28.50
Drop forge flashings	29.00 to 29.50
No. 1 RR. hvy. melting	30.00 to 30.50
Rails 3 ft and under	43.00 to 44.00
Rails 18 in. and under	45.00 to 46.00
No. 1 machinery cast	45.00 to 46.00
RR. cast	45.00 to 46.00
RR. grate bars	32.00 to 33.00
Stove plate	36.00 to 37.00
Malleable	39.00 to 40.00

Youngstown

No. 1 hvy. melting	\$31.50 to \$32.00
No. 2 hvy. melting	29.50 to 30.00
No. 1 bundles	31.50 to 32.00

Scrap IRON & STEEL Prices

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

No. 2 bundles	\$26.50 to \$27.00
Machine shop turn.	20.50 to 21.00
Shoveling turnings	22.00 to 22.50
Cast iron borings	22.00 to 22.50

Buffalo

No. 1 hvy. melting	\$29.50 to \$30.00
No. 2 hvy. melting	27.50 to 28.00
No. 1 busheling	27.50 to 28.00
No. 1 bundles	28.50 to 29.00
No. 2 bundles	26.00 to 26.50
Machine shop turn.	20.00 to 20.50
Mixed bor. and turn.	21.00 to 21.50
Shoveling turnings	22.50 to 23.00
Cast iron borings	21.00 to 21.50
Low phos. plate	31.00 to 32.00
Scrap rails, random lgth.	33.50 to 34.00
Rails 2 ft and under	39.50 to 40.00
RR. steel wheels	35.00 to 36.00
RR. spring steel	35.00 to 36.00
RR. couplers and knuckles	35.00 to 36.00
No. 1 cupola cast	36.00 to 37.00
Mixed yard cast	36.00 to 36.50
Stove plate	35.00 to 36.00
Small indus. malleable	24.00 to 24.50

Birmingham

No. 1 hvy. melting	\$27.00
No. 2 hvy. melting	26.00
No. 2 bundles	24.00
No. 1 busheling	26.00
Machine shop turn.	\$16.00 to 17.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	18.00
Bar crops and plate	30.00 to 31.00
Structural and plate	30.00 to 31.00
No. 1 RR. hvy. melt.	28.00 to 28.50
Scrap rails, random lgth.	30.00 to 31.00
Rerolling rails	36.00 to 37.00
Rails 2 ft and under	35.50 to 36.00
Angles & splice bars	35.00 to 36.00
Std. steel axles	28.00 to 29.00
No. 1 cupola cast	35.00 to 36.00
Stove plate	28.00 to 29.00
Cast iron carwheels	28.00 to 29.00

St. Louis

No. 1 hvy. melting	\$30.50 to \$31.50
No. 2 hvy. melting	26.50 to 27.00
No. 1 bundles	26.50 to 27.00
No. 2 bundles	19.50 to 20.00
Machine shop turn.	14.50 to 15.00
Mixed bor. and turn.	16.50 to 17.00
Shoveling turnings	17.50 to 18.00
Cast iron borings	17.50 to 18.00
Low phos. 18 in. under	34.00 to 35.00
Rails, random lengths	34.00 to 35.00
Rails, 18 in. and under	43.00 to 44.00
No. 1 cupola cast	40.00 to 41.00
Hvy. breakable cast	33.00 to 34.00
Drop broken cast	42.00 to 43.00

New York

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	\$20.00 to \$20.50
No. 2 hvy. melting	18.50 to 19.00
No. 2 bundles	17.50 to 18.00
Mixed bor. and turn.	11.00 to 12.00
Shoveling turnings	12.50 to 13.00
Clean cast chem. bor.	23.00 to 24.00
No. 1 machinery cast	29.00 to 30.00
Mixed yard cast	27.00 to 28.00
Charging box cast	27.00 to 28.00
Heavy breakable cast	27.00 to 28.00
Unstrp. motor blocks	22.00 to 23.00

Boston

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	\$19.50 to \$20.00
No. 2 hvy. melting	17.00 to 17.50
No. 1 bundles	19.50 to 20.00

No. 2 bundles	\$15.00 to \$15.50
Machine shop turn.	11.00 to 11.50
Mixed bor. and turn.	11.00 to 11.50
Shoveling turnings	13.00 to 13.50
Clean cast chem. borings	18.50 to 19.00
No. 1 machinery cast	\$32.00 to \$34.00
No. 2 machinery cast	28.00 to 29.00
Heavy breakable cast	25.00 to 26.00
Stove plate	25.00 to 26.00

Detroit

Brokers' buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$24.00 to \$25.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 bundles	26.00 to 27.00
New busheling	25.00 to 26.00
Flashings	24.00 to 25.00
Machine shop turn.	16.00 to 16.50
Mixed bor. and turn.	16.00 to 16.50
Shoveling turnings	17.50 to 18.00
Cast iron borings	17.50 to 18.00
Low phos. plate	26.00 to 27.00
No. 1 cupola cast	36.00 to 37.00
Heavy breakable cast	29.00 to 30.00
Automotive cast	36.00 to 37.00

Cincinnati

Per gross ton, f.o.b. cars:	
No. 1 hvy. melting	\$26.50 to \$27.00
No. 2 hvy. melting	24.50 to 25.00
No. 1 bundles	26.50 to 27.00
No. 2 bundles	19.50 to 20.00
Machine shop turn.	14.50 to 15.00
Mixed bor. and turn.	16.50 to 17.00
Shoveling turnings	17.50 to 18.00
Cast iron borings	17.50 to 18.00
Low phos. 18 in. under	34.00 to 35.00
Rails, random lengths	34.00 to 35.00
Rails, 18 in. and under	43.00 to 44.00
No. 1 cupola cast	40.00 to 41.00
Hvy. breakable cast	33.00 to 34.00
Drop broken cast	42.00 to 43.00

San Francisco

No. 1 hvy. melting	\$20.00
No. 2 hvy. melting	18.00
No. 1 bundles	16.00
No. 2 bundles	16.00
No. 3 bundles	12.00
Machine shop turn.	9.00
Elec. fur. 1 ft and under	28.00
No. 1 RR. hvy. melting	20.00
Scrap rails, random lgth.	20.00
No. 1 cupola cast	\$30.00 to 35.00

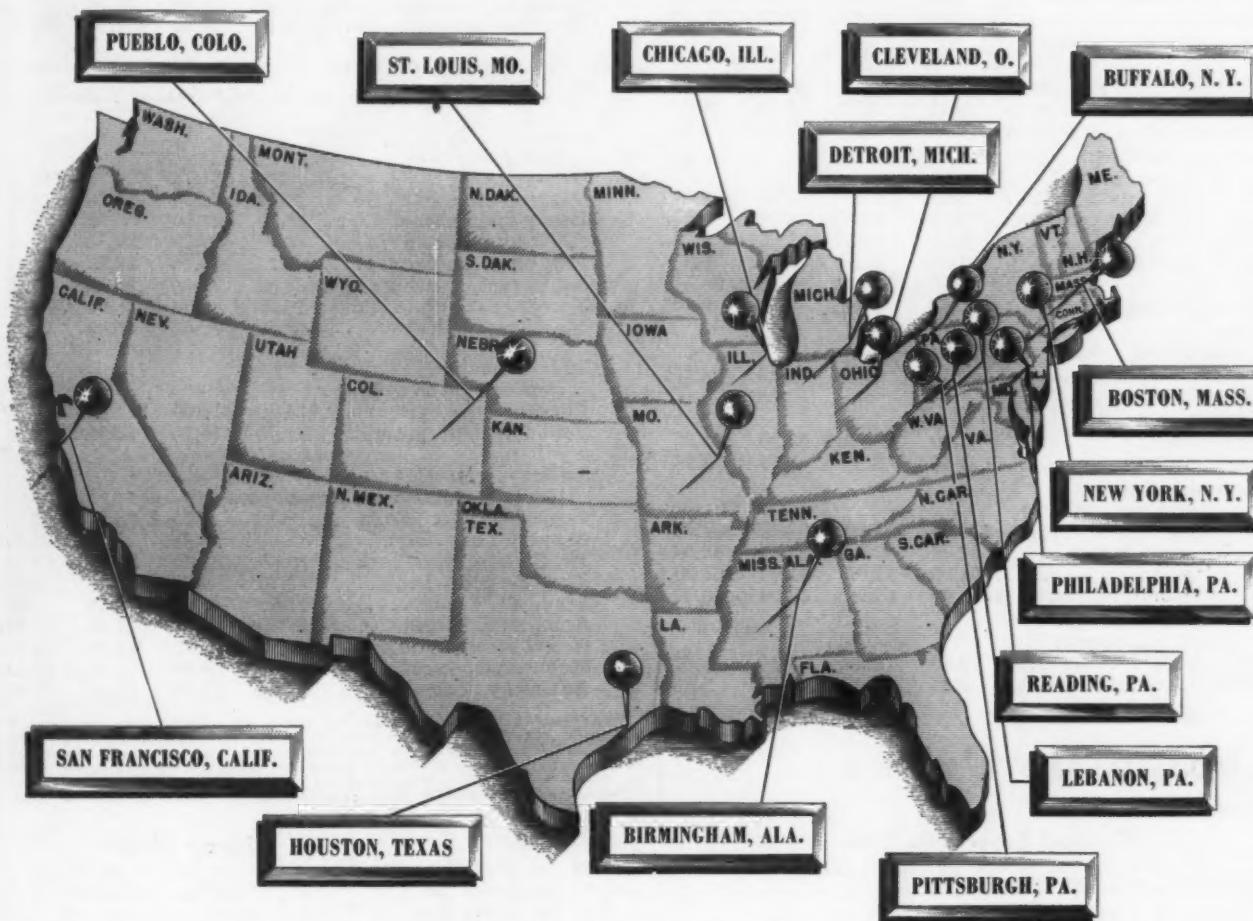
Seattle

No. 1 hvy. melting	\$18.00

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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Comparison of Prices

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel:	Dec. 13,	Dec. 6,	Nov. 15,	Dec. 14,	
	(cents per pound)	1949	1949	1949	1948
Hot-rolled sheets	3.25	3.25	3.25	3.26	
Cold-rolled sheets	4.00	4.00	4.00	4.00	
Galvanized sheets (10 ga)	4.40	4.40	4.40	4.40	
Hot-rolled strip	3.25	3.25	3.25	3.265	
Cold-rolled strip	4.038	4.038	4.038	4.063	
Plates	3.40	3.40	3.40	3.42	
Plates wrought iron.....	7.85	7.85	7.85	7.85	
Stains C-R strip (No. 302)	33.00	33.00	33.00	33.25	

Tin and Terneplate:

	(dollars per base box)	1949	1949	1949	1948
Tinplate (1.50 lb) cokes..	\$7.75	\$7.75	\$7.75	\$6.80	
Tinplate, electro (0.50 lb)	6.70	6.70	6.70	6.00	
Special coated mfg. ternes	6.65	6.65	6.65	5.90	

Bars and Shapes:

	(cents per pound)	1949	1949	1949	1948
Merchant bars	3.35	3.35	3.35	3.37	
Cold-finished bars	3.995	3.995	3.995	3.995	
Alloy bars	3.75	3.75	3.75	3.75	
Structural shapes	3.25	3.25	3.25	3.25	
Stainless bars (No. 302)	28.50	28.50	28.50	28.50	
Wrought iron bars.....	9.50	9.50	9.50	9.50	

Wire:

	(cents per pound)	1949	1949	1949	1948
Bright wire	4.15	4.15	4.15	4.256	

Rails:

	(dollars per 100 lb)	1949	1949	1949	1948
Heavy rails	\$3.20	\$3.20	\$3.20	\$3.20	
Light rails	3.55	3.55	3.55	3.55	

Semifinished Steel:

	(dollars per net ton)	1949	1949	1949	1948
Rerolling billets	\$52.00	\$52.00	\$52.00	\$52.00	
Slabs, rerolling	52.00	52.00	52.00	52.00	
Forging billets	61.00	61.00	61.00	61.00	
Alloy blooms, billets, slabs	63.00	63.00	63.00	63.00	

Wire rod and Skelp:

	(cents per pound)	1949	1949	1949	1948
Wire rods	3.40	3.40	3.40	3.619	
Skelp	3.25	3.25	3.25	3.25	

Price advances over previous week are printed in Heavy Type; declines appear in Italics.

Pig Iron:	Dec. 13,	Dec. 6,	Nov. 15,	Dec. 14,	
	(per gross ton)	1949	1949	1949	1948
No. 2, foundry, Phila....	\$50.42	\$50.42	\$50.42	\$51.56	
No. 2, Valley furnace....	46.50	46.50	46.50	46.50	
No. 2, Southern Cin'ti....	46.08	46.08	46.08	49.47	
No. 2, Birmingham.....	39.38	39.38	39.38	43.38	
No. 2, foundry, Chicago†	46.50	46.50	46.50	46.50	
Basic del'd Philadelphia....	49.92	49.92	49.92	50.76	
Basic, Valley furnace....	46.00	46.00	46.00	46.00	
Malleable, Chicago†	46.50	46.50	46.50	46.50	
Malleable, Valley	46.50	46.50	46.50	46.50	
Charcoal, Chicago	68.56	68.56	68.56	73.78	
Ferrromanganese†	173.40	173.40	173.40	161.71	

†The switching charge for delivery to foundries in the Chicago district is \$1 per ton.

‡Average of U. S. prices quoted on Ferroalloy page.

Scrap:

Scrap:	(per gross ton)	1949	1949	1949	1948
Heavy melt'g steel, P'gh.	\$30.75	\$31.75	\$32.75	\$42.75	
Heavy melt'g steel, Phila.	24.50	24.50	25.50	44.50	
Heavy melt'g steel, Ch'go	26.50	27.50	30.50	41.75	
No. 1 hy. com. sh't, Det.	26.50	27.50	27.50	38.00	
Low phos. Young'n.....	32.75	33.75	36.75	47.75	
No. 1, east, Pittsburgh....	39.50	39.50	39.50	70.00	
No. 1, cast, Philadelphia....	38.00	38.00	38.00	65.50	
No. 1, cast, Chicago.....	39.50	42.50	45.00	70.00	

Coke: Connellsville:

Coke: Connellsville:	(per net ton at oven)	1949	1949	1949	1948
Furnace coke, prompt...	\$14.00	\$14.00	\$14.25	\$15.00	
Foundry coke, prompt...	15.75	15.75	15.75	17.00	

Nonferrous Metals:

Nonferrous Metals:	(cents per pound to large buyers)	1949	1949	1949	1948
Copper, electro, Conn....	18.50	18.50	18.50	23.50	
Copper, Lake Conn....	18.625	18.625	18.625	23.625	
Tin Straits, New York....	79.00	81.00	94.00	\$1.03	
Zinc, East St. Louis....	9.75	9.75	9.75	17.50	
Lead, St. Louis.....	11.80	11.80	12.55	21.30	
Aluminum, virgin	17.00	17.00	17.00	17.00	
Nickel electrolytic	42.97	42.97	42.97	42.90	
Magnesium, ingot	20.50	20.50	20.50	20.50	
Antimony, Laredo, Tex..	32.00	32.00	32.00	35.00	

Starting with the issue of May 12, 1949, the weighted finished steel composite was revised for the years 1941 to date. The weights used are based on the average product shipments for the 7 years 1937 to 1940 inclusive and 1940 to 1948 inclusive. The use of quarterly figures has been eliminated because it was too sensitive. (See p. 139 of May 12, 1949, issue.)

Pig Iron	Scrap Steel
\$45.88 per gross ton....	\$27.25 per gross ton....
... 45.88 per gross ton....	... 27.92 per gross ton....
... 45.88 per gross ton....	... 29.58 per gross ton....
... 46.91 per gross ton....	... 43.00 per gross ton....

High	Low	High	Low
\$46.82 Jan. 4	\$45.88 Sept. 6	\$43.00 Jan. 1	\$19.33 June 25
46.91 Oct. 12	39.58 Jan. 6	43.16 July 27	39.75 Mar. 9
37.98 Dec. 30	30.14 Jan. 7	42.58 Oct. 28	29.50 May 20
30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
\$23.61	\$23.61	19.17 Jan. 11	15.76 Oct. 24
23.61	23.61	\$19.17	\$19.17
23.61	23.61	19.17	19.17
\$23.61 Mar. 20	\$23.45 Jan. 2	\$22.00 Jan. 7	\$19.17 Apr. 10
23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

Fifty years of service

1899 — 1949



SCHIAVONE • BONOMO CORP.

FOOT OF JERSEY AVE., JERSEY CITY, N. J., U. S. A. • Cable Address "SCHIABO" NEW YORK

HARRISON, N. J. • NEWARK, N. J. • BROOKLYN, N. Y. • BRONX, N. Y. • STAMFORD, CONN.

IRON AGE STEEL PRICES	Smaller numbers in price boxes indicate producing companies. For main office locations, see key on facing page. Base prices at producing points apply only to sizes and grades produced in these areas. Prices are in cents per lb unless otherwise noted. Extras apply.													
	Pittsburgh	Chicago	Gary	Cleveland	Canton Massillon	Middle-town	Youngstown	Bethle-hem	Buffalo	Conshohocken	Johns-town	Sparrows Point	Granite City	Detroit
INGOTS Carbon forging, net ton	\$50.00 1													\$80.00 31
Alloy net ton	\$51.00 1-17													\$51.00 31
BILLETS, BLOOMS, SLABS Carbon, rerolling net ton	\$52.00 1	\$52.00 1	\$52.00 1				\$57.00 18		\$52.00 8	\$57.00 26	\$52.00 3			
Carbon forging billets, net ton	\$61.00 1	\$61.00 1-6	\$61.00 1-8	\$61.00 4			\$61.00 25		\$61.00 8-4	\$63.00 26	\$61.00 8			\$61.00 31
Alloy, net ton	\$63.00 1-17	\$63.00 1-4	\$63.00 1		\$63.00 4-43		\$63.00 18	\$63.00 3	\$63.00 8-4	\$65.00 26	\$63.00 3			\$63.00 31
SHEET BARS							\$57.00 18							
PIPE SKELP	3.25 1.5						3.25 1.4							
WIRE RODS	3.40 2.18	3.40 2.4-33	3.40 6	3.40 2			3.40 8				3.40 8	3.50 3		
SHEETS Hot-rolled (18 ga. & hvr.)	3.25 1.5-9.15	3.25 23	3.25 1.6-8	3.25 4.5			3.25 1.4-6.18		3.25 3	3.35 26		3.25 8		3.45 12
Cold-rolled	4.00 ¹⁻⁵ 7.9-15.63		4.00 1.6-8	4.00 4.5		4.00 7	4.00 4.6		4.00 3			4.00 8	4.20 22	4.20 13
Galvanized (10 gage)	4.40 1.9-15		4.40 1.8		4.40 4		4.40 ⁶ 5.65 ¹⁴					4.40 8		
Enameling (12 gage)	4.40 1		4.40 1.8	4.40 4		4.40 7	4.40 ⁶ 4.90 ⁷⁶						4.60 23	4.70 12
Long ternes (10 gage)	4.80 9.15		4.80 1			4.80 7								
Hi Str. low alloy, h.r.	4.95 1.5-9	4.95 1	4.95 1.6-8	4.95 4.5			4.95 1.4-6.18		4.95 3	4.95 21		4.95 8		5.15 13
Hi Str. low alloy, c.r.	6.05 1.5		6.05 1.6-8	6.05 4.5			6.05 4.6-18		6.05 8			6.05 8		6.25 13
Hi Str. low alloy, galv.	6.75 1			6.75 4	6.75 4							6.75 8		
STRIP Hot-rolled (over 8 in.)	3.25 5.7-9.28	3.25 28.66	3.25 1.6-8	3.25 5			3.25 1.4-6.18		3.25 8			3.25 8		3.45 12.47
Cold-rolled	4.00 5.7-9.63	4.15 66	4.00 8	4.00 2.5		4.00 7	4.00 ¹³ 4.6-13-40-48-49		4.00 8			4.00 8		4.20 ¹²⁻¹⁷ 4.25 ⁶⁸⁻⁸¹
Hi Str. low alloy, h.r.	4.95 5		4.95 1.6-8	4.95 5			4.95 1.4-6.18		4.95 8			4.95 8		5.15 13
Hi Str. low alloy, c.r.	6.05 5.9		6.05 5.5				6.05 4.6-18		6.05 8			6.05 8		6.25 13
TINPLATE [†] Cokes, 1.50-lb, base box	\$7.75 1.5-9.15		\$7.75 1.6-8				\$7.75 4					\$7.85 8	\$7.95 22	
Electrolytic 0.25, 0.50, 0.75 lb box														
Deduct \$1.30, \$1.05 and 75¢ respectively from 1.50-lb coke base box price														
BLACKPLATE, 20 gage Hollowware enameling	5.30 1.5-15		5.30 1.6-8				5.30 4					5.40 8	5.50 22	
BARS Carbon steel	3.35 1.5-9.17	3.35 1.4-23	3.35 1.6-8	3.35 4	3.35 4		3.35 1.4-6		3.35 8-4		3.35 8		3.55 13	
Reinforcing [‡]	3.35 1.5	3.35 4	3.35 1.6-8	3.35 4	3.35 4		3.35 1.6-8		3.35 8-4		3.35 8	3.35 8		
Cold-finished	3.95 ³ 4.00 ²⁻⁴ 17.52-69.71	4.00 ² 28.69-70	4.00 4.73-74	4.00 2.61	4.00 4.82		4.00 6.40-67		4.00 70					4.30 12
Alloy, hot-rolled	3.75 1.17	3.75 1.4-23	3.75 1.6-8	3.75 4.42			3.75 1.6-25	3.75 8	3.75 8-4		3.75 8		4.05 13	
Alloy, cold-drawn	4.65 2.17-52-59.71	4.65 3.28-69.70	4.65 4.73-74	4.65 2.61	4.65 4.63-62		4.65 6.25-57	4.65 8	4.65 8-70					
Hi Str. alloy, h.r.	5.10 1.5		5.10 1.6-8	5.10 4			5.10 1.6	5.10 8	5.10 8		5.10 8		5.30 13	
PLATE Carbon Steel	3.40 1.5	3.40 1	3.40 1.6-8	3.40 4			3.40 18		3.40 8	3.50 28	3.40 8	3.40 8	3.65 2	
Floor plates	4.55 1	4.55 1	4.55 8	4.55 8-34								4.55 28		
Alloy	4.40 1	4.40 1	4.40 1				4.40 18				4.40 28	4.40 8	4.40 8	
Hi Str. low alloy	5.20 1.5	5.20 1	5.20 1.5	5.20 4.5			5.20 6				5.20 26	5.20 8	5.20 8	5.45 13
SHAPES, Structural	3.25 1.5-9	3.25 1.58	3.25 1.6-8					3.30 8	3.30 8			3.30 8		
Hi Str. low alloy	4.95 1.5	4.95 1	4.95 1.6-8				4.95 6	5.05 8	5.05 8		5.05 8			
MANUFACTURERS' WIRE Bright	4.15 2.5-18	4.15 ² 4.23-34		4.15 2.77			4.15 8					4.15 8	4.25 2	Duluth=4.15 ³ Pueblo=4.50 ¹⁴
PILING, Steel sheet	4.05 1.9	4.05 1							4.05 8					

Smaller numbers indicate producing companies. See key at right.
Prices are in cents per lb unless otherwise noted. Extras apply.

Kansas City	Houston	Birm-	WEST COAST Seattle, San Francisco, Los Angeles, Fontana		IRON AGE STEEL PRICES	
					INGOTS Carbon forging, net ton	
	\$89.00 83				Alloy, net ton	
		\$52.00 11	F=\$71.00 ¹⁹		BILLETS, BLOOMS, SLABS Carbon, rerolling, net ton	
	\$88.00 83	\$61.00 11	F=\$80.00 ¹⁹	Geneva=\$61.00 ¹⁶	Carbon forging billets, net ton	
	\$71.00 83		F=\$82.00 ¹⁹		Alloy net ton	
				Manfield=\$58.00 G. T. ⁷⁸ Portsmouth=\$55.00 ²⁰	SHEET BARS	
					PIPE SKELP	
					WIRE RODS	
			SF, LA=4.05 ²⁴ LA=4.20 ²²	Portsmouth=3.40 ²⁰ Worcester=3.70 ²	SHEETS Hot-rolled (18 ga. & hvr.)	
		3.26 4.11	LA=3.95 ²⁴ F=4.15 ¹⁹	Kokomo, ²⁰ Ashland ⁷ =3.25 Niles=3.75 ⁷⁸	Cold-rolled	
		4.00 11	SF=4.95 ²⁴ F=4.90 ¹⁹		Galvanized (10 gage)	
		4.40 4.11	SF, LA=5.15 ²⁴	Ashland=4.40 ⁷ Kokomo=4.80 ²⁰	Enameling (12 gage)	
					Long ternes (10 gage)	
		4.95 11			Hi Str. low alloy, h.r.	
					Hi Str. low alloy, c.r.	
					Hi Str. low alloy, galv.	
	3.85 83	3.85 83	3.25 11	SF, LA=4.00 ²² F=4.90 ¹⁹ , S=4.25 ²²	Ashland=3.25 ⁷ Atlanta=3.40 ²⁵	STRIP Hot-rolled
				F=4.90 ¹⁹ LA=5.00 ²⁷	New Haven=4.50 ²⁴	Cold-rolled
		4.95 11				Hi Str. low alloy, h.r.
				F=6.95 ¹⁹		Hi Str. low alloy, c.r.
				\$7.85 11	TINPLATE Cokes, 1.50-lb, base box	Electrolytic 0.25, 0.50, 0.75 lb box
						BLACKPLATE, 29 gage Hollowware enameling
						BARS Carbon steel
						Reinforcing [‡]
						Cold-finished
						Alloy, hot-rolled
						Alloy, cold-drawn
						Hi Str. low alloy, h.r.
		5.10 4				PLATE Carbon steel
						Harrisburg=4.55 ²⁵
						Floor plates
						Coatesville=4.50 ²¹
						Alloy
						Geneva=5.20 ¹⁶
						Hi Str. low alloy
						SHAPES, Structural
						Hi Str. low alloy
						MANUFACTURERS' WIRE Bright

Notes: [†]Special coated mfg ternes, deduct \$1.10 from 1.50-lb coke base box price.
Can-making quality blackplate, 55 to 128-lb, deduct \$2.00 from 1.50-lb coke base box.
[‡]Straight lengths only from producer to fabricator.

KEY TO STEEL PRODUCERS With Principal Offices

- 1 Carnegie-Illinois Steel Corp., Pittsburgh
- 2 American Steel & Wire Co., Cleveland
- 3 Bethlehem Steel Co., Bethlehem
- 4 Republic Steel Corp., Cleveland
- 5 Jones & Laughlin Steel Corp., Pittsburgh
- 6 Youngstown Sheet & Tube Co., Youngstown
- 7 Armcro Steel Corp., Middletown, Ohio
- 8 Inland Steel Co., Chicago
- 9 Weirton Steel Co., Weirton, W. Va.
- 10 National Tube Co., Pittsburgh
- 11 Tennessee Coal, Iron & R. R. Co., Birmingham
- 12 Great Lakes Steel Corp., Detroit
- 13 Sharon Steel Corp., Sharon, Pa.
- 14 Colorado Fuel & Iron Corp., Denver
- 15 Wheeling Steel Corp., Wheeling, W. Va.
- 16 Geneva Steel Co., Salt Lake City
- 17 Crucible Steel Co. of America, New York
- 18 Pittsburgh Steel Co., Pittsburgh
- 19 Kaiser Co., Inc., Oakland, Calif.
- 20 Portsmouth Steel Corp., Portsmouth, Ohio
- 21 Lukens Steel Co., Coatsville, Pa.
- 22 Granite City Steel Co., Granite City, Ill.
- 23 Wisconsin Steel Co., South Chicago, Ill.
- 24 Columbia Steel Co., San Francisco
- 25 Copperweld Steel Co., Glassport, Pa.
- 26 Alan Wood Steel Co., Conshohocken, Pa.
- 27 Calif. Cold Rolled Steel Corp., Los Angeles
- 28 Allegheny Ludlum Steel Corp., Pittsburgh
- 29 Worth Steel Co., Claymont, Del.
- 30 Continental Steel Corp., Kokomo, Ind.
- 31 Rotary Electric Steel Co., Detroit
- 32 Laclede Steel Co., St. Louis
- 33 Northwestern Steel & Wire Co., Sterling, Ill.
- 34 Keystone Steel & Wire Co., Peoria, Ill.
- 35 Central Iron & Steel Co., Harrisburg, Pa.
- 36 Carpenter Steel Co., Reading, Pa.
- 37 Eastern Stainless Steel Corp., Baltimore
- 38 Washington Steel Corp., Washington, Pa.
- 39 Jessop Steel Co., Washington, Pa.
- 40 Blair Strip Steel Co., New Castle, Pa.
- 41 Superior Steel Corp., Carnegie, Pa.
- 42 Timken Steel & Tube Div., Canton, Ohio
- 43 Babcock & Wilcox Tube Co., Beaver Falls, Pa.
- 44 Reeves Steel & Mfg. Co., Dover, Ohio
- 45 John A. Roebling's Sons Co., Trenton, N. J.
- 46 Simonds Saw & Steel Co., Fitchburg, Mass.
- 47 McLouth Steel Corp., Detroit
- 48 Cold Metal Products Co., Youngstown
- 49 Thomas Steel Co., Warren, Ohio
- 50 Wilson Steel & Wire Co., Chicago
- 51 Sweet's Steel Co., Williamsport, Pa.
- 52 Superior Drawn Steel Co., Monaca, Pa.
- 53 A. M. Byers Co., Pittsburgh
- 54 Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
- 55 Ingersoll Steel Div., Chicago
- 56 Phoenix Iron & Steel Co., Phoenixville, Pa.
- 57 Fitzsimons Steel Co., Youngstown
- 58 Stanley Works, New Britain, Conn.
- 59 Universal-Cyclops Steel Corp., Bridgeville, Pa.
- 60 Vanadium-Alloys Steel Co., Latrobe, Pa.
- 61 Cuyahoga Steel & Wire Co., Cleveland
- 62 Bethlehem Pacific Coast Steel Corp., San Francisco
- 63 Follansbee Steel Corp., Pittsburgh
- 64 Niles Rolling Mill Co., Niles, Ohio
- 65 Atlantic Steel Co., Atlanta
- 66 Acme Steel Co., Chicago
- 67 Joslyn Mfg. & Supply Co., Chicago
- 68 Detroit Steel Corp., Detroit
- 69 Wyckoff Steel Co., Pittsburgh
- 70 Bliss & Laughlin, Inc., Harvey, Ill.
- 71 Columbia Steel & Shafting Co., Pittsburgh
- 72 Cumberland Steel Co., Cumberland, Md.
- 73 La Salle Steel Co., Chicago
- 74 Monarch Steel Co., Inc., Indianapolis
- 75 Empire Steel Co., Mansfield, Ohio
- 76 Mahoning Valley Steel Co., Niles, Ohio
- 77 Oliver Iron & Steel Co., Pittsburgh
- 78 Pittsburgh Screw & Bolt Co., Pittsburgh
- 79 Standard Forgings Corp., Chicago
- 80 Driver Harris Co., Harrison, N. J.
- 81 Detroit Tube & Steel Div., Detroit
- 82 Reliance Div., Eaton Mfg. Co., Massillon, Ohio
- 83 Sheffield Steel Corp., Kansas City

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. mill

Base Column
Pittsburg,
Calif.

Standard & coated nails*	103	122
Woven wire fence†	109	132
Fence posts, carloads‡	112	
Single loop bale ties	106	130
Galvanized barbed wire**	123	143
Twisted barbless wire	123	

* Pgh., Chi., Duluth; Worcester, 6 columns higher; Houston, 8 columns higher; Kansas City, 12 columns higher. † 15½ gage and heavier. ** On 80 rod spools, in carloads. ‡ Duluth, Joliet and Johnstown.

Base per Pittsburg,
100 lb Calif.

Annealed fence wire†	\$4.80	\$5.75
Annealed, galv. fencing†	5.25	6.20
Cut nails, carloads‡	6.75	

† Add 30¢ at Worcester; 10¢ at Sparrows Pt.
‡ Less 20¢ to jobbers.

PRODUCING POINTS — Standard, Coated or galvanized nails, woven wire fence, bale ties, and barbed wire: Alabama City, Ala., 4; Atlanta, 65; Alliquippa, Pa. (except bale ties), 5; Bartonsville, Ill. (except bale ties), 34; Chicago, 4; Donora, Pa., 2; Duluth, 2; Fairfield, Ala., 11; Johnstown, Pa. (except bale ties), 3; Joliet, Ill., 2; Kokomo, Ind., 30; Minnequa, Colo., 14; Monessen, Pa. (except bale ties), 18; Pittsburgh, Calif., 24; Portsmouth, Ohio, 20; Rankin, Pa. (except bale ties), 2; Sparrows Point (except woven fence), 3; Sterling, Ill., 33; San Francisco (except nails and woven fence), 14; Torrance, Calif. (nails only), 24; Worcester (nails only), 2; Houston (except bale ties), 83; Kansas City (except bale ties), 83.

Fence posts: Duluth, 2; Johnstown, Pa., 3; Joliet, Ill., 2; Minnequa, Colo., 14; Moline, Ill., 4; Williamsport, Pa., 51.

Cut nails: Wheeling, W. Va., 15; Conshohocken, Pa., 26.

CLAD STEEL

Base prices, cents per pound, f.o.b. mill
Stainless-carbon Plate Sheet

No. 304, 20 pct.	
Coatesville, Pa. (21)	*26.50
Washington, Pa. (39)	*26.50
Claymont, Del. (29)	*26.50
Conshohocken, Pa. (26)	*22.50
New Castle, Ind. (55)	*26.50
24.00	
Nickel-carbon	
10 pct, Coatesville, (26)	27.50
Inconel-carbon	
10 pct, Coatesville, (21)	36.00
Monel-carbon	
10 pct, Coatesville, (21)	29.00
No. 302 Stainless-copper-stainless, Carnegie, Pa. (41)	75.00
Aluminized steel sheets, hot dip, Butler, Pa., (7)	7.75

* Includes annealing and pickling, or sandblasting.

ELECTRICAL SHEETS

24 gage, HR cut lengths, f.o.b. mill

Cents per lb

Armature	*5.45
Electrical	*5.95
Motor	6.70
Dynamo	7.50
Transformer 72	8.05
Transformer 65	8.60
Transformer 58	9.30
Transformer 52	10.10

PRODUCING POINTS — Beech Bottom, W. Va., 18; Brackenridge, Pa., 28; Foliansbee, W. Va., 63, add 1.75¢; Granite City, Ill., 22; Indiana Harbor, Ind., 8; Mansfield, Ohio, 75; Niles, Ohio, 64, 76, add 0.50¢; Vandergrift, Pa., 1; Warren, Ohio, 4; Zanesville, Ohio, 7.

Numbers after producing points correspond to steel producers.
See key on Steel Price page.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. mill Pittsburgh, Cleveland, Birmingham or Chicago)
Base discount less case lots

Machine and Carriage Bolts

Pct Off List

1/2 in. & smaller x 6 in. & shorter	35
9/16 & 5/8 in. x 6 in. & shorter	37
3/4 in. & larger x 6 in. shorter	34
All diam., longer than 6 in.	30
Lag, all diam over 6 in. & longer	35
Lag, all diam x 6 in. & shorter	37
Plow bolts	47

RAILS, TRACK SUPPLIES

F.o.b. mill

Standard rails, 100 lb and heavier, No. 1 quality, per 100 lb	\$8.20
Joint bars, per 100 lb	4.20
Light rails per 100 lb	3.55

Base Price
cents per lb

Track spikes	5.35
Axles	5.20
Screw spikes	8.00
Tie plates	4.05
Tie plates, Pittsburgh, Torr., Calif.	4.20
Track bolts, untreated	8.25
Track bolts, heat treated, to railroads	8.50

* Seattle, add 30¢.
† Kansas City, 5.60¢.

PRODUCING POINTS — Standard rails: Bessemer, Pa., 1; Eadsley, Ala., 11; Gary, 1; Indiana Harbor, Ind., 8; Lackawanna, N. Y., 3; Minnequa, Colo., 14; Steelton, Pa., 3.

Light rails: All the above except Indiana Harbor and Steelton, plus Fairfield, Ala., 11; Johnstown, Pa., 3; Minnequa, Colo., 14.

Joint bars: Bessemer, Pa., 1; Fairfield, Ala., 11; Indiana Harbor, Ind., 8; Joliet, Ill., 1; Lackawanna, N. Y., 3; Steelton, Pa., 3; Minnequa, Colo., 14.

Track spikes: Fairfield, Ala., 11; Lebanon, Pa., 3; Minnequa, Colo., 14; Pittsburgh, 77, 78.

Axles: Fairfield, Ala., 11; Gary, 1; Indiana Harbor, Ind., 79; Johnstown, Pa., 3; McKees Rocks, Pa., 1.

Tie plates: Fairfield, Ala., 11; Gary, 1; Indiana Harbor, Ind., 8; Lackawanna, N. Y., 3; Pittsburgh, Calif., 24; Pittsburgh, 4; Seattle, 62; Steelton, Pa., 3; Torrance, Calif., 24; Minnequa, Colo., 14.

TOOL STEEL

F.o.b. mill

Base

Large Rivets	(1/2 in. and larger)
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	Base per 100 lb \$6.75
F.o.b. Lebanon, Pa.	6.75
Small Rivets	(7/16 in. and smaller)
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	Pct off List 48

Cap and Set Screws	(In packages)
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	46
% to 1 in. x 6 in., SAE (1035), heat treated	35
Milled studs	19
Flat head cap screws, listed sizes	5
Fillister head cap, listed sizes	28

High-carbon-chromium	53¢
Oil hardened manganese	29¢
Special carbon	26.5¢
Extra carbon	22¢
Regular carbon	19¢

Warehouse prices on and east of Mississippi are 2½¢ per lb higher. West of Mississippi, 4½¢ higher.

COKE

Furnace, beehive (f.o.b. oven) Net Ton Connellsburg, Pa. \$13.50 to \$14.50

Foundry, beehive (f.o.b. oven) Connellsburg, Pa. \$15.50 to \$16.00

Foundry, oven coke	
Buffalo, del'd	\$20.90
Chicago, f.o.b.	20.40
Detroit, f.o.b.	19.40
New England, del'd	22.70
Seaboard, N. J., f.o.b.	22.00
Philadelphia, f.o.b.	20.45
Swedeland, Pa., f.o.b.	20.40
Plainesville, Ohio, f.o.b.	20.30
Erie, del'd	\$20.25 to 21.04
Cleveland, del'd	22.63
Cincinnati, del'd	21.71
St. Paul, f.o.b.	23.50
St. Louis, del'd	21.50
Birmingham, del'd	18.75

FLUORSPAR

Washed gravel fluor spar, f.o.b. cars, Rosciare, Ill. Base price, per ton net:

Effective CaF ₂ content:	
70% or more	\$37.00
60% or less	34.00

STAINLESS STEELSBase prices, in cents per pound,
f.o.b. producing point

Product	301	302	303	304	316	321	347	410	416	430
Ingots, rolling	12.75	13.50	15.00	14.50	22.75	18.25	20.00	11.25	13.75	11.50
Slabs, billets, rolling	17.00	18.25	20.25	19.25	30.25	24.50	26.75	15.00	18.50	15.25
Forg. discs, die blocks, rings	30.50	30.50	33.00	32.00	49.00	38.50	41.00	24.50	28.00	25.00
Billets, forging	24.25	24.25	25.25	25.00	39.00	29.00	32.75	18.50	20.00	20.00
Bars, wire, structural	28.50	28.50	31.00	30.00	46.00	34.00	38.50	23.00	23.50	23.50
Plates	32.00	32.00	34.00	34.00	50.50	39.50	44.00	26.00	28.50	28.50
Sheets	37.50	37.50	39.50	39.50	63.00	45.50	50.00	33.00	33.50	35.50
Strip, hot-rolled	24.25	25.75	30.00	27.75	46.00	34.50	38.75	21.25	28.00	21.75
Strip, cold-rolled	30.50	33.00	36.50	35.00	55.00	44.50	48.50	27.00	33.50	27.50

Numbers correspond to producers. See Key on Steel Price Page.

STAINLESS STEEL PRODUCING POINTS—Sheets: Midland, Pa., 17; Brackenridge, Pa., 28; Butler, Pa., 7; McKeesport, Pa., 1; Washington, Pa., 38, 39; Baltimore, 37; Middletown, Ohio, 7; Massillon, Ohio, 4; Gary, 1; Bridgeville, Pa., 59; New Castle, Ind., 55; Lockport, N. Y., 46.

Strip: Midland, Pa., 17; Cleveland, 2; Carnegie, Pa., 41; McKeesport, Pa., 54; Reading, Pa., 36; Washington, Pa., 38; W. Leechburg, Pa., 28; Bridgeville, Pa., 59; Detroit, 47; Massillon, Canton, Ohio, 4; Middletown, Ohio, 7; Harrison, N. J., 49; Youngstown, 48; Lockport, N. Y., 46; New Britain, Conn., 58; Sharon, 13; Butler, Pa., 7; Bars: Baltimore, 7; Duquesne, Pa., 1; Munhall, Pa., 1; Reading, Pa., 36; Titusville, Pa., 59; Washington, Pa., 39; McKeesport, Pa., 1, 54; Bridgeville, Pa., 59; Dunkirk, N. Y., 28; Massillon, Ohio, 4; Chicago, 1, 67; Syracuse, N. Y., 17; Watervliet, N. Y., 28; Waukegan, Ill., 2; Lockport, N. Y., 46; Canton, Ohio, 42.

Wire: Waukegan, Ill., 2; Massillon, Ohio, 4; McKeesport, Pa., 54; Bridgeport, Conn., 44; Chicago, 67; Trenton, N. J., 45; Harrison, N. J., 80; Baltimore, 7; Dunkirk, 28.

Structural: Baltimore, 7; Massillon, Ohio, 4; Chicago, 1, 67; Watervliet, N. Y., 28; Bridgeport, Conn., 44.

Plates: Brackenridge, Pa., 28; Butler, Pa., 7; Chicago, 1; Munhall, Pa., 1; Midland, Pa., 17; New Castle, Ind., 55; Lockport, N. Y., 46; Middletown, 7; Washington, Pa., 39; Cleveland, Massillon, 4.

Forged discs, die blocks, rings: Pittsburgh, 1, 17; Syracuse, 17; Ferndale, Mich., 28.

Forging billets: Midland, Pa., 17; Baltimore, 7; Washington, Pa., 39; McKeesport, 54; Massillon, Canton, Ohio, 4; Watervliet, 28; Pittsburgh, Chicago, 1.

REFRACTORIES (F.o.b. works)**Fire Clay Brick** Carloads, Per 1000

First quality, Ill., Ky., Md., Mo., Ohio, Pa. \$80.00
(except Salina, Pa., add \$5)
No. 1 Ohio 74.00
Sec. quality, Pa., Md., Ky., Mo., Ill. 74.00
No. 2 Ohio 66.00
Ground fire clay, net ton, bulk (except Salina, Pa., add \$1.50) 11.50

Silica Brick

Mt. Union, Pa., Ensley, Ala. \$80.00
Childs, Pa. 84.00
Hays, Pa. 85.00
Chicago District 89.00
Western, Utah and Calif. 95.00
Super Duty, Hays, Pa., Athens, Tex. \$85.00 to 95.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.) \$13.75 to 14.00
Silica cement, net ton, bulk, Hays, Pa. 16.00
Silica cement, net ton, bulk, Ensley, Ala. 15.00
Silica cement, net ton, bulk, Chicago District \$14.75 to 15.00
Silica cement, net ton, bulk, Utah and Calif. 21.00

Chrome Brick Per Net Ton
Standard chemically bonded, balt., Chester \$69.00**Magnesite Brick**

Standard, Baltimore \$91.00
Chemically bonded, Baltimore 80.00

Grain Magnesite Std. % -in. grains

Domestic, f.o.b. Baltimore, in bulk, fines removed \$56.00 to \$65.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines 30.50 to 31.00
in sacks with fines 35.00 to 35.50

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk, Midwest, add 10¢; Missouri Valley, add 20¢ \$12.25

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.
Swedish sponge iron c.i.f. New York, ocean bags 7.4¢ to 9.0¢

Domestic sponge iron, 98+% Fe, carload lots 9.0¢ to 15.0¢
Electrolytic iron, annealed, 99.5+% Fe 31.5¢ to 39.5¢
Electrolytic iron unannealed, minus 325 mesh, 99+% Fe 48.5¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe 63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 microns, 99.8+% Fe 90.0¢ to \$1.75
Aluminum 29.00¢
Antimony 45.78¢
Brass, 10 ton lots 22.75¢ to 25.75¢
Copper, electrolytic 28.625¢
Copper, reduced 28.50¢
Cadmium \$2.40
Chromium, electrolytic, 99% min. \$3.50
Lead 19.02¢
Manganese 55.00¢
Molybdenum, 99% \$2.65
Nickel, unannealed 61.00¢
Nickel, spherical, minus 30 mesh, unannealed 68.00¢
Silicon 34.00¢
Solder powder 8.5¢ plus metal cost
Stainless steel, 302 75.00¢
Tin 96.00¢
Tungsten, 99% \$2.90
Zinc, 10 ton lots 15.50¢ to 18.25¢

ELECTRODES

Cents per lb, f.o.b. plant, threaded electrodes with nipples, unboxed.

Diam. In. in.	Length in. in.	Cents Per lb
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GRAPHITE

17, 18, 20	60, 72	16.00¢
8 to 16	48, 60, 72	16.50¢
7	48, 60	17.75¢
6	48, 60	19.00¢
4, 5	40	19.50¢
3	40	20.50¢
2 1/2	24, 30	21.00¢
2	24, 30	23.00¢

CARBON

40	100, 110	7.50¢
35	65, 110	7.50¢
30	65, 84, 110	7.50¢
24	72 to 104	7.50¢
17 to 20	84, 90	7.50¢
14	60, 72	8.00¢
10, 12	60	8.25¢
8	60	8.50¢

PIPE AND TUBINGBase discounts, f.o.b. mills
Base price, about \$200.00 per net ton**Standard, Threaded and Coupled**

Steel, buttweld*	Black	Galv
1/2-in.	43 to 41	26 1/2 to 24 1/2
5/8-in.	46 to 44	30 1/2 to 28 1/2
1-in.	48 1/2 to 46 1/2	33 1/2 to 31 1/2
1 1/4-in.	49 to 47	34 to 32
1 1/2-in.	49 1/2 to 47 1/2	34 1/2 to 32 1/2
2-in.	50 to 48	35 to 33
2 1/2 to 3-in.	50 1/2 to 48 1/2	35 1/2 to 33 1/2

Steel, lapweld

2-in.	39 1/2	26 to 24
2 1/2 to 3-in.	43 1/2 to 42 1/2	28 to 27
3 1/2 to 6-in.	46 1/2 to 42 1/2	31 to 27

Steel, seamless

2-in.	38 1/2	23
2 1/2 to 3-in.	41 1/2	26
3 1/2 to 6-in.	43 1/2	28

Wrought Iron, buttweld

1/2-in.	+ 20 1/2	+ 47
5/8-in.	+ 10 1/2	+ 36
1-in. 1 1/4 in.	+ 4 1/2	+ 27
1 1/2-in.	- 1 1/2	+ 23 1/2
2-in.	- 2	+ 23

Wrought Iron, lapweld

2-in.	+ 7 1/2	+ 31
2 1/2 to 3 1/2-in.	+ 5	+ 26 1/2
4-in.	list	+ 20 1/2
4 1/2 to 8-in.	+ 2	+ 22

Extra Strong, Plain Ends

Steel, buttweld		
1/2-in.	42 to 40	27 to 25
5/8-in.	46 to 44	31 to 29
1-in.	48 to 46	34 to 32
1 1/4-in.	48 1/2 to 46 1/2	34 1/2 to 32 1/2
1 1/2-in.	49 to 47	35 to 33
2-in.	49 1/2 to 47 1/2	35 1/2 to 34 1/2
2 1/2 to 3-in.	50 to 48	36 to 34

Steel, seamless

2-in.	37 1/2	23
2 1/2 to 3-in.	41 1/2	27
3 1/2 to 6-in.	45	30 1/2

Wrought Iron, buttweld

1/2-in.	+ 16	+ 40
5/8-in.	+ 9 1/2	+ 34
1 to 2-in.	- 1	+ 23

Wrought Iron, lapweld

2-in.	+ 4 1/2	+ 27 1/2
2 1/2 to 4-in.	- 5	+ 16
4 1/2 to 6-in.	- 1	+ 20 1/2

For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3 1/2-in. and larger four points higher discount (lower price) applies. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. *Fontana, Calif., deduct 11 points from figures in left columns.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Prices per 100 ft at mill in car-load lots, cut length 4 to 24 ft inclusive.

OD Gage	Seamless	Electric Weld			
in. BWG	H.R. C.R. H.R. C.D.				
2	13	\$19.18	\$22.56	\$18.60	\$21.89
2 1/2	12	25.79	30.33	25.02	29.41
3	12	28.68	33.76	27.82	32.74
3 1/2	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78

CAST IRON WATER PIPE

Per net ton

6 to 20-in., del'd Chicago	\$95.70

</tbl

WAREHOUSE PRICES

Base prices, f.o.b. warehouse, dollars per 100 lb.
(Metropolitan area delivery, add 15c to base price except Cincinnati
and New Orleans (*), add 10c; New York, Chicago and Boston, add 20c).

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS				
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (15 gage)	Hot-Rolled	Cold-Rolled			Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 410-50 As-rolled	Hot-Rolled, A 410-50 Ann.	Cold-Drawn, A 410-50 Ann.	Cold-Drawn, A 410-50 Ann.
Baltimore.....	5.31	6.21-	6.95-	5.37	....	5.56	5.38	5.42	6.18	....	9.80-	10.10	....	....
Birmingham.....	4.85	5.75	6.15	4.85	....	5.10	4.90	4.90	6.58	....	....	....	....	....
Boston.....	5.55	6.48-	7.11-	5.80	6.75	5.75	5.42	5.82	6.02	9.38-	9.67-	10.72	11.02	....
Buffalo.....	4.85	5.75	7.42-	5.24	7.27	5.35	5.00	4.95	5.40	5.30	9.80	10.85	10.95	....
Chicago.....	4.85	5.75	6.85	4.85	6.45- 6.15	5.10	4.80	4.80	5.40	8.90	9.20	10.25	10.55	....
Cincinnati*	5.18-	5.84-	6.59-	5.28-	....	5.53-	5.33	5.33-	6.00-	9.74	9.89	11.19	11.44	....
Cleveland.....	5.51	6.28	6.93	5.43	....	5.85	5.48	5.48	6.20	....	....	....	....	....
Detroit.....	5.28-	6.07-	7.38-	5.27-	6.27-	5.52-	5.33-	5.23-	6.00-	9.87	9.92	11.11	11.38	....
Houston.....	5.32	6.18	7.58	5.47	6.58	5.57	5.40	5.55	6.18	....	....	....	....	....
Indianapolis.....	6.70	....	7.30	6.70	....	6.70	6.20	6.40-	7.60	10.45	10.40	11.45	11.70	....
Kansas City.....	5.29	6.13	7.44	5.29	7.38	5.54	5.34	5.34	6.14	11.25	11.39	....	....	....
Kansas City.....	5.50	6.40	7.50	5.50	6.85 ⁵	5.75	5.55	5.55	6.10	9.85	9.85	10.90	11.20	....
Los Angeles.....	5.45 ¹⁷	7.00	7.40 ¹⁷	5.95 ¹⁷	7.38 ¹⁷	5.80 ¹⁷	5.45 ¹⁷	5.80 ¹⁷	7.28 ⁸	9.55 ³¹	9.75 ³¹	10.95 ³¹	11.35 ³¹	....
Memphis.....	5.75-	6.60	7.20	5.80-	6.80	5.95-	5.75	5.75	6.53	....	....	....	....	....
Milwaukee.....	5.03	5.93	7.02	5.03	6.32	5.28	5.08	5.08	5.63	9.08	9.38	10.43	10.73	....
New Orleans*	5.95	6.75	....	6.15	....	6.15	5.95	5.95	6.65 ⁶	....	....	....	....	....
New York.....	5.40	6.31	8.85-	5.82	6.70	5.65	5.33	5.57	6.31	9.28	9.58	10.83	10.93	....
Norfolk.....	6.08	....	....	6.20	....	6.06	6.05	6.05	7.05	....	....	....	....	....
Omaha.....	6.13	....	8.33	6.13	....	6.38	6.18	6.18	6.98	....	....	....	....	....
Philadelphia.....	4.95	6.24 ¹³	6.83	5.40	6.29	5.35	5.10	5.40	6.98	9.05	9.35	10.82	10.87	....
Pittsburgh.....	4.85	5.75	6.90	5.00	6.00	5.05	4.90	4.90	5.40	8.90	9.20	10.25	10.55	....
Portland.....	6.50 ⁴ -	8.00	8.80-	6.85 ⁸	....	6.30 ⁸	6.35 ⁸	6.35 ⁸	8.25 ¹⁴	10.50 ⁸	10.10 ⁸	....	....	....
Salt Lake City.....	7.05	7.05	8.65	7.45 ³	....	5.85 ³	5.80 ³	7.10 ⁸	8.15	....	....	....	....	....
San Francisco.....	6.15 ⁸	7.50 ²	7.80	6.75 ⁸	8.25 ⁸	6.38 ⁸	6.00 ⁸	5.90 ⁸	7.55	9.80	10.00	11.20	11.60	....
Seattle.....	6.70 ⁴ -	8.18 ² -	8.80	6.70 ⁴	....	6.35 ⁴	6.30 ⁴	6.20 ⁴	8.15 ¹⁴	....	10.35 ¹⁵	....	13.10 ¹	....
St. Louis.....	5.22-	6.12-	7.32	5.22	6.68-	5.47	5.27	5.27	5.82	9.27-	9.57-	10.62-	10.92-	....
St. Paul.....	5.37	6.27	7.54	5.34	7.54	5.82	5.64-	5.64	6.49	8.72	9.87	11.17	11.42	....
	5.44	6.18-	7.54-	5.44	6.82	5.69	5.64	5.64	6.04	9.49	9.79	10.84	11.14	....

BASE QUANTITIES Standard unless otherwise keyed on prices.

Hot-Rolled:

Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

Alloy Bars:

1000 to 1999 lb.

Cold-Rolled:

Sheets, 400 to 1499 lb strip, extras on all quantities. Bars 1000 lb and over.

Galvanized Sheets:

450 to 1499 lb.

Exceptions:

(1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 499 lb; (4) 300 to 999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb; (18) 1000 to 1499 lb; (19) 1500 to 3499 lb; (20) 6000 lb and over; (21) 2000 to 3999 lb.

PIG IRON PRICES

Dollars per gross ton. Delivered prices do not include 3 pct tax on freight.

PRODUCING POINT PRICES						DELIVERED PRICES (BASE GRADES)							
Producing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Producing Point	Rail Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem.....	48.00	48.50	49.00	49.50	....	Boston.....	Everett.....	\$0.50 Arb.	....	50.50	51.00	....	....
Birmingham.....	38.88	39.38	....	....	....	Boston.....	Steeltown.....	6.90	....	52.79	53.29	53.79	....
Buffalo.....	46.00	46.50	47.00	47.00	....	Brooklyn.....	Bethlehem.....	4.29	....	....	....	....	....
Chicago.....	46.00	46.50	46.50	47.00	51.00	Cincinnati.....	Birmingham.....	6.70	45.50	46.08	....	....	....
Cleveland.....	46.00	46.50	46.50	47.00	....	Jersey City.....	Bethlehem.....	2.63	....	51.13	51.63	52.13	....
Duluth.....	46.00	46.50	46.50	47.00	....	Los Angeles.....	Geneva-Ironton.....	7.70	53.70	54.20	....	....	....
Erie.....	46.00	46.50	46.50	47.00	....	Mansfield.....	Cleveland-Toledo.....	3.33	49.33	49.83	49.83	50.33	54.33
Everett.....	50.00	51.00	....	....	Philadelphia.....	Bethlehem.....	2.39	50.39	50.89	51.39	51.89	....
Granite City.....	47.80	48.40	48.80	....	Philadelphia.....	Swedeland.....	1.44	49.44	49.94	50.44	50.94	....
Ironton, Utah.....	46.00	46.50	....	....	Philadelphia.....	Steeltown.....	3.09	....	....	....	....	57.09	
Pittsburgh.....	46.00	46.50	46.50	47.00	....	San Francisco.....	Buffalo.....	2.63	48.63	49.13	49.63	....	....
Geneva, Utah.....	46.00	46.50	....	....	San Francisco.....	Geneva-Ironton.....	7.70	53.70	54.20	....	....	....
Sharpsville.....	46.00	46.50	46.50	47.00	....	Seattle.....	Geneva-Ironton.....	7.70	53.70	54.20	....	....	....
Steeltown.....	46.00	46.50	46.00	49.50	54.00	St. Louis.....	Granite City.....	0.75 Arb.	48.65	49.15	49.65	....	....
Struthers, Ohio.....	46.00	....	....	....	Syracuse.....	Buffalo.....	3.58	49.58	50.08	50.58	....	....
Swedeland.....	46.00	46.50	49.00	49.50	....							
Toledo.....	46.00	46.50	46.50	47.00	....							
Troy, N. Y.....	46.00	46.50	49.00	49.50	54.00								
Youngstown.....	46.00	46.50	46.50	47.00	....							

Producing point prices are subject to switching charges; silicon differential (not to exceed 50c per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct for foundry iron); phosphorus differentials, a reduction of 3c per ton for phosphorus content of 0.70 pct and over manganese differentials, a charge not to exceed 50c per ton for each 0.50 pct manganese

content in excess of 1.00 pct. \$2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and \$1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.01 to 6.50 pct. C/L per g.t., f.o.b. Jackson, Ohio—\$59.50; f.o.b. Buffalo, \$60.75. Add \$1.00 per ton for each additional 0.50 pct Si up to 17 pct.

Add 50c per ton for each 0.50 pct Mn over 1.00 pct. Add \$1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are \$1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus \$60.00 per gross ton, f.o.b. Lyle, Tenn. Delivered Chicago—\$68.50. High phosphorus charcoal pig iron is not being produced.

FERROALLOYS**Ferromanganese**

78-82% Mn, maximum contact base price, gross ton, lump size.	\$174
F.o.b. Birmingham	\$172
F.o.b. Niagara Falls, Alloy, W. Va., Welland, Ont.	\$172
F.o.b. Johnstown, Pa.	\$174
F.o.b. Sheridan, Pa.	\$172
F.o.b. Etna, Clairton, Pa.	\$175
\$2.00 for each 1% above 82% Mn, penalty, \$2.15 for each 1% below 78%. Briquets—Cents per pound of briquet, delivered, 66% contained Mn.	
Carload, bulk	10.45
Ton lots	12.05
Less ton lots	12.95

Spiegeleisen

Contract prices gross ton, lump, f.o.b.	
16-19% Mn	19-21% Mn
3% max. Si	3% max. Si
Palmerton, Pa.	\$64.00
Pgh. or Chicago	65.00
	66.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.	
96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.	
Carload, packed	35.5
Ton lots	37.0

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.	
Carloads	28
Ton lots	30
Less ton lots	32

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, delivered.	
Carloads Ton Less	
0.07% max. C, 0.06%	
P, 90% Mn	25.25
0.10% max. C	24.75
0.15% max. C	24.25
0.30% max. C	23.75
0.50% max. C	23.25
0.75% max. C	22.75
7.00% max. Si	20.25
	22.10
	23.30

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C. For 2% max. C, deduct 0.2¢.	
Carload bulk	8.95
Ton lots	10.60
Briquet, contract basis carlots, bulk delivered, per lb of briquet	10.30
Ton lots	11.90
Less ton lots	12.80

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., \$77.00 gross ton, freight allowed to normal trade area; Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., \$73.50. Add \$1.00 per ton for each additional 0.50% Si up to and including 18%. Add \$1.00 for each 0.50% Mn over 1%.	
Carload bulk	8.95
Ton lots	10.60
Briquet, contract basis carlots, bulk delivered, per lb of briquet	10.30
Ton lots	11.90
Less ton lots	12.80

Silicon Metal

Contract price, cents per pound Si, lump size, delivered, for ton lots packed.	
96% Si, 2% Fe	20.70
97% Si, 1% Fe	21.10

Silicon Briquets

Contract price, cents per pound of briquet, bulk, delivered, 40% Si, 1 lb Si briquets.	
Carload, bulk	6.30
Ton lots	7.90
Less ton lots	8.80

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size, bulk, in carloads, delivered.	
25% Si	17.00
50% Si	11.30
75% Si	13.50
85% Si	14.65
90-95% Si	16.50

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	\$2.05	\$2.95	\$3.75
Less ton lots	2.40	3.30	4.55

Ferrochrome

Contract prices, cents per pound, contained Cr, lump size, bulk, in carloads, delivered. (65-72% Cr, 2% max. Si)	
0.06% C	28.75
0.10% C	28.25
0.15% C	28.00
0.20% C	27.75
0.50% C	27.50
1.00% C	27.25
2.00% C	27.00
65-69% Cr, 4-9% C	20.50
62-66% Cr, 4-6% C, 6-9% Si	21.35

Briquets — Contract price, cents per pound of briquet, delivered, 60% chromium.

	Carload	Ton lots	Less ton lots
	13.75	15.25	16.15

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, delivered.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	21.60
Ton lots	23.75
Less ton lots	25.25
Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.	
Carloads	27.75
Ton lots	30.05
Less ton lots	31.85

Chromium Metal

Contract prices, per lb chromium contained packed, delivered, ton lots. 97% min. Cr, 1% max. Fe.

0.20% max. C

0.50% max. C

9.00% min. C

Contract price per lb of alloy, lump, delivered.

30-33% Ca, 60-65% Si, 3.00% max. Fe.

Carloads

Ton lots

Less ton lots

Calcium-Manganese-Silicon

Contract prices, cents per lb of alloy, lump, delivered.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads

Ton lots

Less ton lots

CMZ

Contract price, cents per pound of alloy, delivered.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

Ton lots

Less ton lots

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.

Ton lots

Less ton lots

SMZ

Contract price, cents per pound of alloy, delivered. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, 1/2 in. x 12 mesh.

Ton lots

Less ton lots

Other Ferroalloys

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.

Carload

Ton lots

Less ton lots

Calcium molybdate, 45-50%, f.o.b. Langeloeth, Pa., per pound contained Mo.

Ferrrocolumbium, 50-60% contract basis, delivered, per pound contained Cb.

Ton lots

Less ton lots

Ferromolybdenum, 55-75%, f.o.b. Langeloeth, Pa., per pound contained Mo.

Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$3 unitage, per gross ton

10 tons to less carload

Less ton lots

Ferrotitanium, 40%, regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti.

Ferrotitanium, 25%, low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed east of Mississippi and north of Baltimore, carloads per net ton.

Ferrotungsten, standard, lump

1/4 in. x down, packed, per pound contained W, 5 ton lots, delivered

Less ton lots

Ferrovanadium, 35-55%, contract basis, delivered, per pound, contained V.

Openhearth

Crucible

High speed steel (Primos)

Molybdenum oxide briquets, f.o.b. Langeloeth, Pa.; bags, f.o.b. Wash., Pa., per lb contained Mo.

Simanal, 20% Si, 20% Mn, 20%

Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound

Carload, bulk, lump

Ton lots, bulk, lump

Ton lots, packed, lump

Less ton lots, lump

Vanadium pentoxide, 88-92% V₂O₅, contract basis, per pound contained V₂O₅

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

Ton lots

Zirconium, 12-15%, contract basis, lump, delivered, per lb of alloy.

Carload, bulk

Boron Agents

Contract prices, per lb of alloy, del.

Borosil, f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B

Bortam, f.o.b. Niagara Falls

Ton lots, per pound

Less ton lots, per pound

Carbortam, f.o.b. Suspension Bridge, N. Y.; freight allowed, Ti 15-18%, B 1.00-1.50%, Si 2.5-3.0%, Al 1.0-2.0%

Ton lots, per pound

14 to 14% B

14 to 19% B

19% min. B

Grainal, f.o.b. Bridgeville, Pa.

freight allowed, 100 lb and over.

No. 1

No. 6

No. 79

Manganese-Boron 75.00% Mn, 15-20%

B, 5% max. Fe, 1.50% max. Si, 3.00%

max. C, 2 in. x D, delivered.

Ton lots

Less ton lots

Nickel-Boron 15-18% B, 1.00% max. Al,

1.50% max. Si, 0.50% max. C, 3.00%

max. Fe, balance Ni, delivered.

Less ton lots

Silcaz, contract basis, delivered

Ton lots

11.67

1.79

93¢

63¢

45¢

14.70

1.20

REPAIR-FREE RAILS for a year and one-half

... rather than a month and one-half



CARBOFRAX silicon carbide skid rails were installed in this furnace in an attempt to cut down the frequent, recurring and expensive maintenance necessary when alloy skids were used. At the end of 18 months, CARBOFRAX skids had worn only $1\frac{1}{4}$ " ... were flush with the chrome hearth. The greatly reduced furnace repair charges per ton of steel rolled contrast sharply with those of the alloy skids which required essential repairs every six weeks...an expense that was increased by high labor costs of week-end shutdowns. Figures reveal a saving more than 4 times the installed cost of the CARBOFRAX rails. In addition, freedom from skid buckling has facilitated furnace operation.



During this period, approximately 120,000 tons of steel were pushed over the CARBOFRAX rails—alloy and stainless steel billets $2\frac{3}{8}$ " to $5\frac{1}{2}$ " square by 50" to 90" long and plain carbon steel rounds 5" to 7" in diameter up to 15' in length. Temperatures vary from 1900° to 2275°F .

This experience parallels that of a

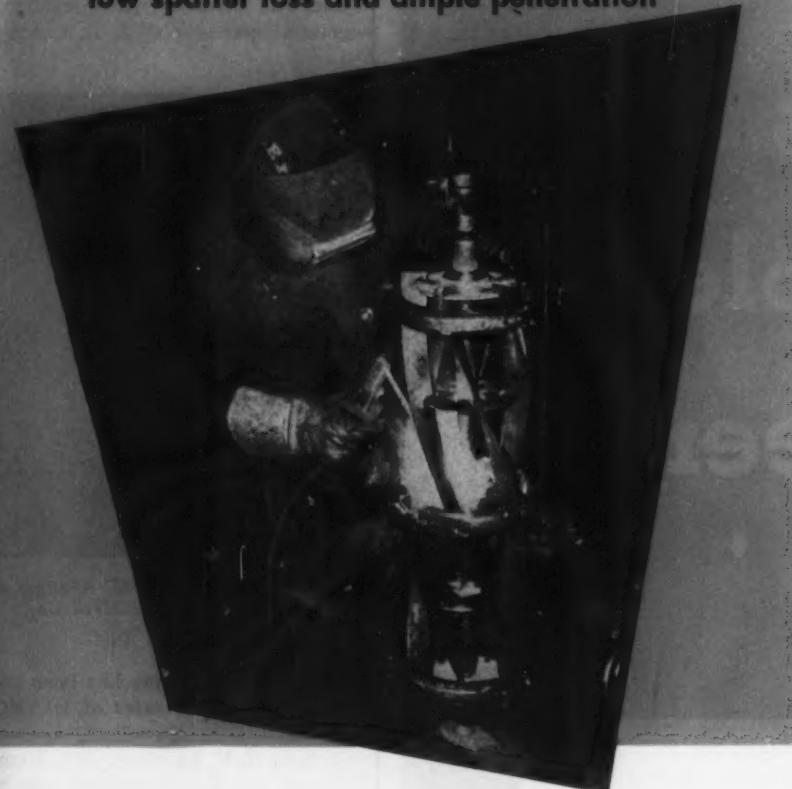
variety of furnace installations where CARBOFRAX skid rails have promoted greater production and operating economy. Write Dept. G-129A for detailed data or discuss your problems with one of our engineers. The Carborundum Company, Refractories Division, Perth Amboy, New Jersey.

CARBOFRAX Skid Rails
by **CARBORUNDUM**
TRADE MARK

"Carborundum" and "Carbofrax" are registered trademarks which indicate manufacture by The Carborundum Company

For Extremely Low Hydrogen Content Weld Deposits

with no under bead cracking, minimum porosity,
low spatter loss and ample penetration



No. 312 Electrode for Mild Steel (E-6016)

No. 394 Electrode for High Tensile Steel
of High Hardenability (E-10016)

Due to the extremely low hydrogen content of the weld deposits, Airco No. 312 (all position A-C or D-C) is especially recommended for welding hard-to-weld steels (without preheating) such as hardenable steels . . . high sulphur free machining steels . . . cold rolled steels . . . low alloy or mild steels where stress relieving cannot be employed . . . and steels to be vitreous enamelled after welding.

Airco No. 394 (all position A-C or D-C) provides low hydrogen content weld metal deposits of *high tensile strength* on hardenable steels without pre-heat or post-heat treatment. It is also used on carbon

steel containing 0.30% or more carbon and should be used on steel containing alloying elements in addition to a high carbon content.

For more information about Airco Nos. 312 and 394 Electrodes, write your name and address on the margin below and send it to your nearest Airco office or authorized dealer for a copy of Catalog ADC-650A.

More news about
AIRCO products



NO. 387 ELECTRODE
(E-6012)

A high speed all position electrode (D-C or A-C) — ideal for welding mild steel when fit-up is poor. It exhibits excellent operating characteristics, particularly when welding vertically down, and produces a minimum of spatter. Airco No. 387 maintains a high degree of welding performance throughout the entire length of the electrode when high currents are used.

NO. 375 ELECTRODE

Specifically designed for producing machinable welds in cast iron. Deposits are smooth and uniform, bonding well with the cast material; free from internal and surface porosity; and make water-tight joints. Also, color of deposits will approximate that of cast iron. No. 375 can be used in all positions with A-C or D-C.

AIRCOLITE HARDFACING ALLOY

This new alloy (for oxyacetylene and electric application) is especially recommended for pulverizer hammers, coke crusher rolls, and similar parts, subject to *severe abrasion and medium impact*. With one application of this wear-retarding material, the service life of both new and worn parts is increased, in some cases, at least 25 times.

* * *

Air Reduction supplies Oxygen, Acetylene and other industrial gases . . . Carbide . . . and a complete line of gas cutting machines, gas welding apparatus and supplies, plus arc welders, electrodes and accessories. Ask us about anything pertaining to gas welding and cutting, and we're glad to help you.



AIR REDUCTION

Offices in Principal Cities

BROSIUS*

stands for
sensible
engineering

* You'll see the mark of BROSIUS on Clay Guns, Forging Manipulators, Goggle Valves, Furnace Chargers, Clam Shell Buckets, Soaking Pit Covers, Slag Granulating Mills, and Coke Testing Barrels. Where the mark appears, you can be sure of rugged, practical equipment, sensibly engineered. BROSIUS builds no over-engineered prima-donnas difficult to operate and maintain. And you can take advantage of BROSIUS hard-headed blast furnace and steel mill engineering experience whether or not it involves standard BROSIUS equipment. If you have a difficult design problem, call on BROSIUS. Write today.



Iron Age Introduces

Continued from Page 23

B. T. Roe has been appointed vice-president in charge of sales for TRACY MFG. CO., Pittsburgh. Mr. Roe was formerly vice-president and general manager of J. N. Ceazan Co.



MILTON L. HUEMME, manager of coke sales, Diamond Alkali Co.

Milton L. Huemme has been named manager of coke sales of DIAMOND ALKALI CO., Cleveland, succeeding the late B. F. Lambert. Mr. Huemme first joined the company's coke sales office in Cleveland as a sales and service representative in 1936, following 9 years in raw materials supply work at the Pittsburgh office.

Frank M. Lewis has been appointed Pittsburgh district representative for the Construction Materials Dept. of GENERAL ELECTRIC CO., Bridgeport. Mr. Lewis, formerly with the H. Lee Reynolds Co., Pittsburgh, will take over field assignments for GE wire and cable, wiring devices and conduit products.

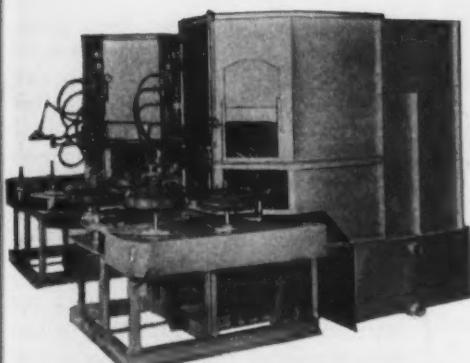
Cy Rossate has been named vice-president in charge of production for ADMIRAL CORP., Chicago. Mr. Rossate has been associated with Admiral since 1934 in various executive capacities.

Craig R. Sheaffer has been elected to the board of directors of the KEO-KUK ELECTRO-METALS CO., Keokuk, Iowa. Mr. Sheaffer is president

ed vice-
es for
h. Mr.
cept and
zian Co.



Putting Air to Work!



Here is a typical example of DeVilbiss engineering skill. This DeVilbiss automatic paints brake drums at the rate of 1,000 per hour. Possibly some phase of your finishing can be done automatically.

Here is a master craftsman—the glass-blower—putting air to work in the practice of his highly skilled profession. Glass-blowers of old were elevated to the nobility and many of their beautiful creations have come down to us through the ages as fitting testimonials to the enduring worth of work well done.

For 61 years DeVilbiss has also made an art of the business of putting air to work. As a result of this long time specialization in increasing production and lowering costs, the name DeVilbiss on a product or complete finishing system is accepted to mean just one thing... *nothing better for the purpose can be found anywhere.*

The unsurpassed speed and efficiency of DeVilbiss systems save valuable man-hours, cut costs, help you produce for less—sell for less. DeVilbiss is today's leading authority on "how to spray it best at lowest cost." When you want such information and the equipment that will do your job best, call DeVilbiss.

THE DEVILBISS COMPANY • Toledo 1, Ohio
Canadian Plant: WINDSOR, ONTARIO

DEVILBISS



means Quality in all four...

SPRAY EQUIPMENT
EXHAUST SYSTEMS
AIR COMPRESSORS
HOSE & CONNECTIONS

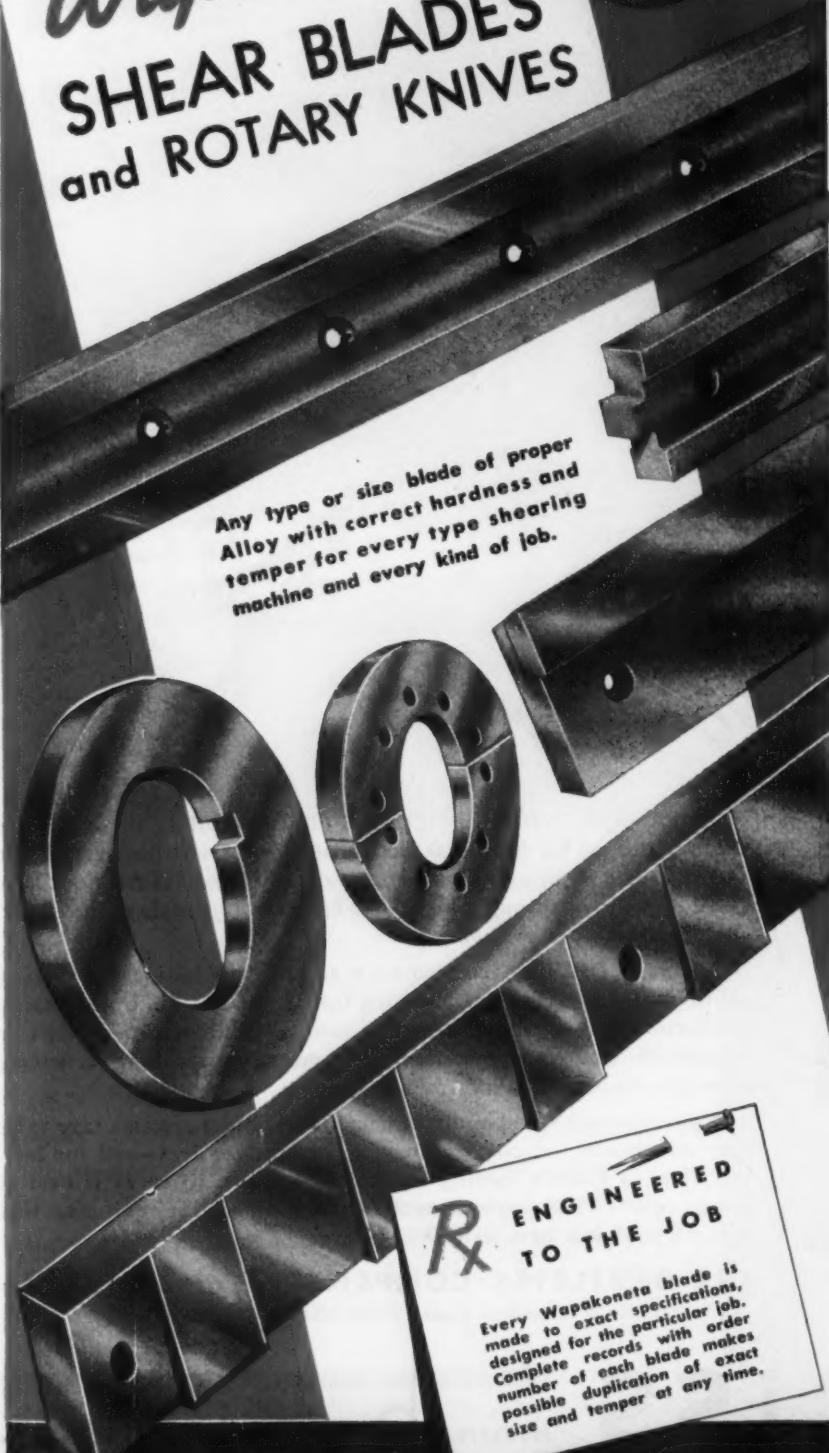
"MULTICUT" "TUF CUT" "HOT WORK"

Wapakoneta

SHEAR BLADES and ROTARY KNIVES



Any type or size blade of proper
Alloy with correct hardness and
temper for every type shearing
machine and every kind of job.



**RX ENGINEERED
TO THE JOB**

Every Wapakoneta blade is
made to exact specifications.
Designed for the particular job.
Complete records with order
number of each blade makes
possible duplication of makes
size and temper at any time.

The
WAPAKONETA MACHINE CO.

Shear Blade Specialists Since 1891
Wapakoneta, Ohio

IRON AGE INTRODUCES*Continued*

and director of the W. A. Sheaffer Pen Co. and also a director of Northwestern Bell Telephone Co.

T. L. Bissell, manager of the industrial power division of ALABAMA POWER CO., has resigned to establish a sales engineering agency in Charleston, S. C.



GEORGE S. FORBES, manager,
Cleveland Industrial Sales Div.,
Glidden Co.

George S. Forbes has been named manager of the Cleveland Industrial Sales Div., THE GLIDDEN CO., succeeding Edward C. Shurtleff, who has retired after 46 years service with the firm. Mr. Forbes joined the company in 1939 serving as a technical correspondent and later as assistant sales manager of the Reading, Pa., division.

Alex Hunter, manager of the Ypsilanti plant of FORD MOTOR CO., has been appointed plant manager of the company's new unit at Monroe, Mich. Mr. Hunter joined Ford in 1933 after graduating from the Henry Ford Trade School. He became a supervisor in 1934 and a plant manager at Manchester in 1942.

W. F. Huntley has been appointed assistant superintendent, Blast Furnace Dept., JONES & LAUGHLIN STEEL CORP., Pittsburgh, succeeding E. H. Riddle.

Thomas C. Ford, formerly Pittsburgh district sales manager for Electro Metallurgical Co., has joined the

THE IRON AGE

Alliance

LADLE CRANES • GANTRY CRANES • STRIPPER CRANES • SOAKING PIT
CRANES • FORGING MANIPULATORS • OPEN HEARTH CHARGING MACHINES
SLAB AND BILLET CHARGING MACHINES • SPECIAL MILL MACHINERY
STRUCTURAL FABRICATION

THE ALLIANCE MACHINE COMPANY

Main Office

ALLIANCE, OHIO

Pittsburgh Office

1622 OLIVER BLDG., PITTSBURGH, PA.

Stitch Metal and Cut Costs with

ACME-MORRISON METAL STITCHER

How Holland Furnace Co. saves 14c per unit!

Formerly Holland spent almost 17½c per assembly to rivet asbestos cloth to a steel frame.

Now, with an Acme-Morrison Metal Stitcher, they stitch their assembly at a cost of only 3½c each. In addition these wire stitches give a stronger fastening than ever!

If you fasten sheet metal to metal or any non-metallic material, using rivets, screws, nails, bolts, or spot welding, you should be able to make similar savings with an Acme-Morrison Metal Stitcher.

Mail the coupon today for full details.

STITCHING WIRE DIVISION

ACME STEEL COMPANY

NEW YORK 17

ATLANTA

CHICAGO 8

LOS ANGELES 11

ACME STEEL COMPANY, Dept. IA-129
2840 Archer Avenue, Chicago 8, Illinois

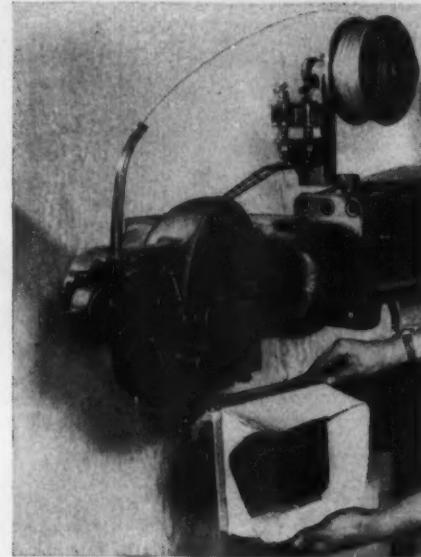
- Send me booklet, "Metal Stitching."
- Have representative call.

Name _____

Company _____

Address _____

City _____ Zone _____ State _____



Stitching asbestos cloth to a steel frame with an Acme-Morrison Metal Stitcher. No pre-punching required.



CROSS-SECTION VIEWS OF STITCHES



IRON AGE INTRODUCES

Continued

Pittsburgh sales staff of the PITTSBURGH METALLURGICAL CO. Mr. Ford had done research work at the Duquesne, Pa., plant of Carnegie-Illinois Steel Corp. before joining Electro Metallurgical in 1936.

D. Gardner Foulke has been appointed chief chemist in charge of analysis and customer service for HANSON - VAN WINKLE - MUNNING CO., Matawan, N. J. He has held the post of process electrochemist for the past 3 years and continues to be responsible for a number of the



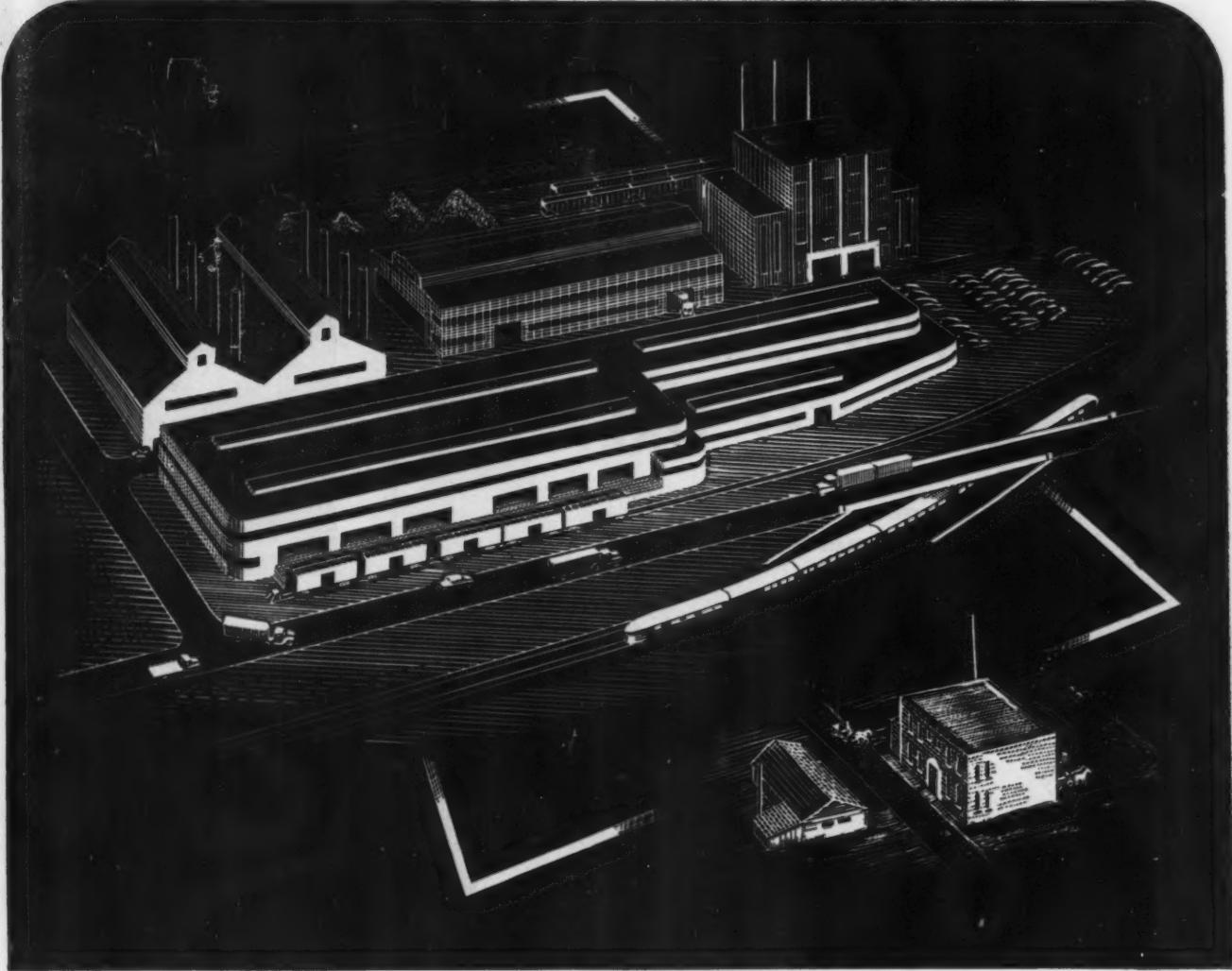
D. GARDNER FOULKE, chief chemist in charge of analysis and customer service, Hanson-Van Winkle-Munning Co.

company's special processes. Thomas J. Menzel has been advanced to the position of plating chemist. For the past several years he has been in charge of analytical work and customers' service work.

Charles R. Stevenson, president, Stevenson, Jordan & Harrison, Inc., New York management engineers, was elected board chairman of MARION POWER SHOVEL CO., Marion, Ohio.

Bart Smith, formerly with A. M. Castle & Co., and Edward W. Fisher, formerly with Ducommun Metals & Supply Co., have been added to the sales force of ZIEGLER STEEL SERVICE CO., Los Angeles.

Harry H. Beyma has been named manager of cold-rolled sales for KAISER STEEL CORP. at Los Angeles. Mr. Beyma has been with the organization since 1944.



SINCE
1850

SINCE 1850 AMERICAN IN- DUSTRY AND COMMERCE,

in their advance from primitive to modern skills and practices, have been paced by the production and transportation of the necessary ores from which have been made the metals that have made their development possible.

**LAKE SUPERIOR IRON ORE • FERRO ALLOYS
VESSEL TRANSPORTATION • COAL**

THE *Cleveland-Cliffs* IRON COMPANY
UNION COMMERCE BUILDING • CLEVELAND 14, OHIO

IRON AGE INTRODUCES

Continued

Anaconda
**NODULIZED
MANGANESE ORE**

Manganese content
approximately 59%

Anaconda
FERROMANGANESE

STANDARD GRADE



Anaconda's production is the principal U. S. source of supply for metallurgical grade manganese ore.

ANACONDA COPPER MINING COMPANY

Offices: 25 Broadway, New York 4, N. Y.
Anaconda, Montana

49352



FRED L. HOPF, general manager, Dynamatic Corp.

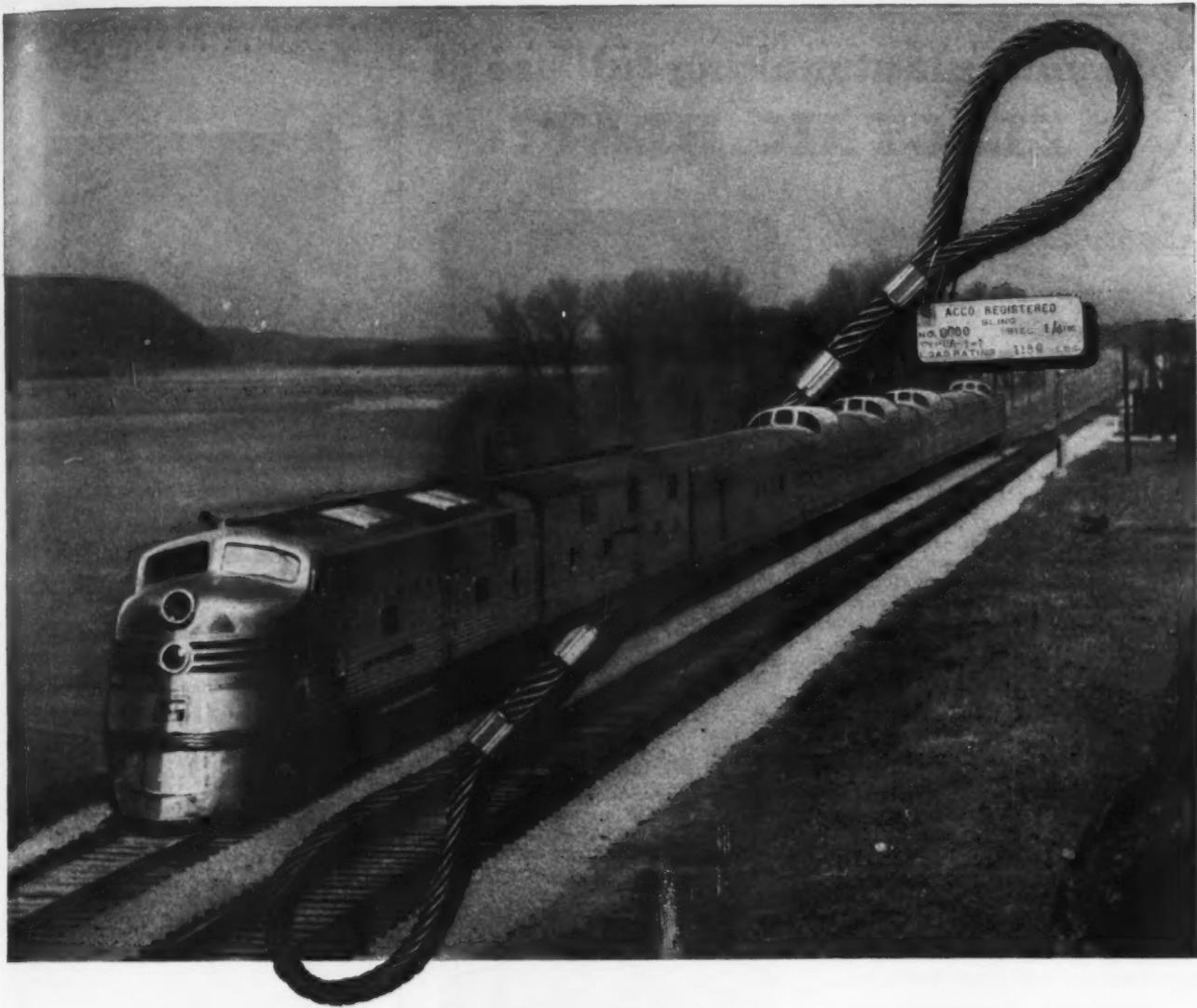
Fred L. Hopf has been appointed general manager of DYNAMATIC CORP., Kenosha, Wis. Mr. Hopf has been connected with Dynamatic Corp. since 1933 when he joined as purchasing agent. He has also been closely connected with the engineering department as sales engineer and also acting as sales manager since 1948.

Walter W. Kempfert has been appointed vice-president in charge of sales of the MAUREY MFG. CORP., Chicago. Mr. Kempfert was formerly with Worthington Pump & Machinery Corp., Harris, N. J., as manager of the Merchandising Div., and later vice-president of sales at Skilsaw, Inc., Chicago.



WALTER W. KEMPFERT, vice-president in charge of sales, Maurey Mfg. Corp.

THE IRON AGE



SLINGS as Modern as today's Streamlined Trains

NOW YOU CAN GET factory-made wire rope slings that are as modern as today's streamlined trains. ACCO Registered Wire Rope Slings are rated to provide positive safety factors of 5 to 1. They are furnished with the ACCO-LOC Splice which develops the full strength of the rope. Their neat, compact, safe endings can be snubbed close. Use any fittings—or use them plain. Use them for basket, bridle or choker hitches. Use them to reduce your material handling costs.

Railroads, industrial plants, contractors, public

utilities, every business that uses slings will find savings in adopting ACCO Registered Wire Rope Slings. Safety engineers acknowledge their superiority and build complete, safe material-handling programs on their known warranted strengths.

Furnished in Strand-Laid, Cable-Laid, and 6 and 8-part Braided, you can get the correct ACCO Registered Wire Rope Sling for any lifting job. ACCO's Stock Sling Service offers you further savings in time and cost. Write today for full information.



MEMBER THE NATIONAL SAFETY COUNCIL

ACCO

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Philadelphia,
Pittsburgh, San Francisco, Bridgeport, Conn.

WIRE ROPE SLING DEPARTMENT
AMERICAN CHAIN & CABLE



In Business for Your Safety



Is your plant making full use of ELECTRIC HEAT?

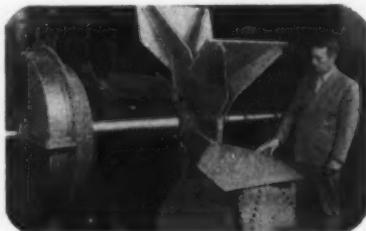
See this film and find out!



1. "HEAT... WHERE YOU WANT IT" is the name of a new General Electric sound slidefilm on industrial electric heaters. It covers dozens of cost-cutting opportunities for electric heat, as in the crank-case cleaner (above) where . . .



2 . . . a built-in immersion heater was used to supply the hot oil needed to do the job right. Another place where electric heat had to make oil "keep moving" was in the feed lines of this fuel-storage tank (above). But the big opportunity for electric heat is in . . .



3 . . . heating surfaces which, in turn, heat something else. Typical of the applications shown in the film is this sludge-drying fan (above) where electric heaters are clamped between the blade sections. A simple application, yet completely effective!



4. If you want to dry, bake, cure, warm, or ripen something, there's plenty of visual data on air heating, too. You can even see how it's done "on the run" as in this continuous air-heating tunnel (above). Or, possibly you'd like to . . .



5 . . . melt a soft metal—and keep it melted, the way it's done in this automatic can-soldering machine (above). "Heat... Where You Want It" has all the facts you need. To convince you of its worthwhileness, we'd like to send you these 5 helpful . . .



6. APPLICATION BULLETINS—FREE! Fifty copies of each come with a complete film kit (35mm slidefilm, 33 1/4 RPM record, bulletins—cost, only \$15). Once you've seen them, you'll want to see—and buy the complete program. MAIL THE COUPON TODAY!

**FREE
to business
management!**

General Electric Co., Section C684-18
Schenectady 5, N. Y.

Attach to your business letterhead

Please send me a complimentary set of your Electric Heater Application Bulletins (GEA-5077, GEA-5095, GEA-5096, GEA-5097, GEA-5098).

I'd like to borrow the sound slidefilm from my nearest G-E office.

Name _____

Title _____

Company _____

Street _____

City _____

State _____

GENERAL ELECTRIC

IRON AGE INTRODUCES

Continued



C. S. FRENCH, assistant general sales manager, Kaiser Aluminum & Chemical Sales, Inc.

C. S. French has been named assistant general sales manager of KAISER ALUMINUM & CHEMICAL SALES, INC., Oakland, Calif. Mr. French joined Kaiser Aluminum in 1946 in Chicago and served as district manager there. J. W. Watson, Jr., has been promoted to central division sales manager, and T. J. Gerber, to Seattle district sales manager. J. W. Johns has been appointed Minneapolis sales representative.

OBITUARIES

Carl R. Dick, 65, director and retired vice-president, Mississippi Valley Structural Steel Co., Decatur, Ill., died Nov. 29.

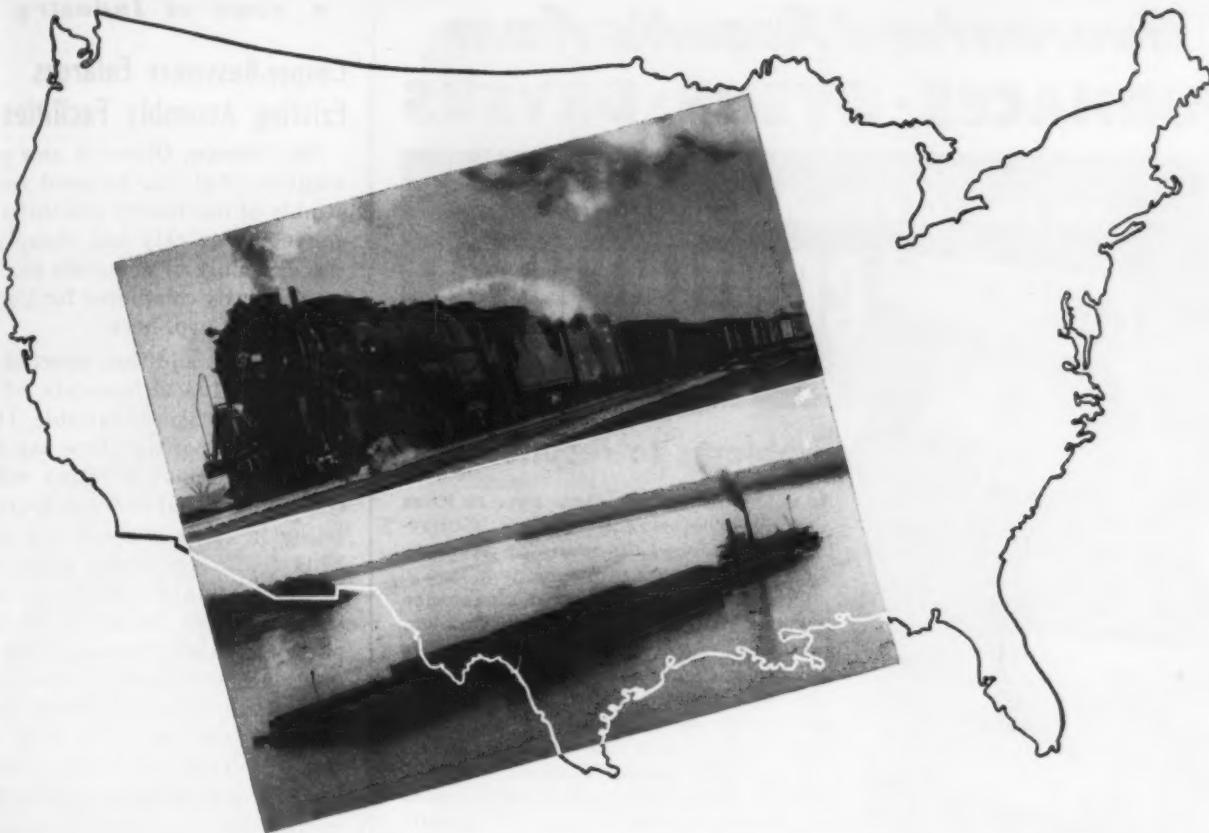
Israel A. Simon, 66, had been president of Duquesne Smelting Corp. and a vice-president and director of Copperweld Steel Corp., died Nov. 17.

Alexander Nimick, Sr., works manager, Colonial Steel Div., Vanadium-Alloys Steel Co., Latrobe, Pa., died Nov. 20.

W. A. Royston, Jr., 65, founder and chairman of the board of directors, Royston Laboratories, Inc., Blawnox, Pa., died Nov. 26.

Dr. Lloyd Noland, 69, superintendent of the Health Dept., Tennessee Coal, Iron & Railroad Co., Birmingham, died Nov. 27.

Resume Your Reading on Page 24



Rail and river right at our door

Since 1878 hundreds of manufacturers in Middle America have profited by Granite City's central location . . . a location that offers distinct shipping advantages. Profited, too, by the fine quality of Granite City Steel, tailor-made to their specific requirements.

Granite City Steel Company has always kept abreast of the newest developments in the industry—yet has remained small enough to pay the strictest attention to minute details of manufacture that mean the finest quality steel.

Ingots
Cold Rolled Coils
Culvert Sheets
Cold Rolled Sheets
Electrical Sheets
Hot Dipped Tin Plate
Electrolytic Tin Plate
Fabricated Products
Corruform
Strongbarn Galvanized Roofing
and Siding (Patented)



Granite City Steel Co.
Granite City, Illinois
Dallas • Kansas City
Memphis • Minneapolis
Moline • St. Louis

**Important reason why
Granite City Steel
is the choice of
Middle America**

December 15, 1949

Guaranteed Results from FURNACES • OVENS • DRYERS

in the OVER-ALL JOB by

CONTINENTAL

problems to results . . .

As varied as the problems were in these heating process requirements, CONTINENTAL produced the solutions. We have the answer to your problems, too.

CONTINENTAL planned performance starts with the analysis of your problem and production requirements. It carries through with the selection and development of the best methods, estimates costs and savings, designs and builds the equipment, and provides the work-handling accessories and control devices. Furthermore, CONTINENTAL handles the complete installation, turning over to you a unitized, producing job with guaranteed results.

Our 25 years' experience and diversified research have produced numerous original designs and improved procedures. All of this data is available for preliminary planning. CONTINENTAL invites you to share its engineering "round table" to discuss the expansion, remodeling, or modernizing plans you have in prospect. There is no obligation.

CONTINENTAL INDUSTRIAL ENGINEERS, INC.
176 W. Adams Street, Chicago 3, Illinois

District Representatives:

Ridgewood, N. J. • Indianapolis • Cincinnati • Milwaukee
St. Louis • Detroit • Cleveland • Pittsburgh



Every Plant Needs CONTINENTAL
Write for This New Booklet No. 127
See How CONTINENTAL Can Help You.

FURNACES
PRODUCTION LINES

CONTINENTAL

SPECIAL MACHINES
COMPLETE PLANTS

MANUFACTURERS—ENGINEERS—CONTRACTORS FOR OVER A QUARTER OF A CENTURY

• News of Industry •

Cooper-Bessemer Enlarges Existing Assembly Facilities

Mt. Vernon, Ohio—A new plant addition that can be used for assembly of machinery sub-units and converted quickly and cheaply for the assembly of complete engines, was recently completed for Cooper-Bessemer Corp. here.

The plant addition, erected at a cost of \$210,000, consists of two bays and makes available 11,000 sq ft of floor space. One bay 30 ft high has a 30-ton crane with a track span equal to track spans existing in other parts of the plant. This feature provides added flexibility of plant operations since the crane can be moved to other parts of the plant at any time production activities so demand. The second bay, having a ceiling height of 20 ft and also provided with similar crane facilities, can be used for lighter and simpler plant operations.

Light weight steel building framework is used throughout. The side covering is transite with glass window paneling attached directly to the wall studding. The heating is of continuous convection type, running all around the building and supplemented by blower units near the ceiling to assure more even heat distribution.

Cooper-Bessemer, like many heavy industries, where production varies substantially from month to month, had the problem of erecting a plant addition, centrally located, with respect to existing production facilities.

Packard Honors 10-Year Workers

Detroit—Packard Motor Car Co. recently presented gold watches or chests of silver to 275 employees who have completed 10 years of service. Eight of the 17 women in the group chose chests of silver in preference to a gold watch indicating completion of 10 years' association with Packard.

C. Wayne Brownell, industrial relations manager, was master of ceremonies. Packard factory executives, including Hugh J. Ferry, executive vice-president, addressed the workers.

THE IRON AGE



Representatives in

ALEXANDRIA, VA.
BUFFALO
CANTON, OHIO
CHICAGO
DENVER
DETROIT
FORT WORTH
INDIANAPOLIS
LOS ANGELES
NEW YORK
PHILADELPHIA
SYRACUSE
TORONTO, CANADA

**ALLOY STEELS AND OTHER
METALS COLD FASHIONED
SINCE 1883**

TOO TOUGH FOR MOST STAMPERS ...but not for Presteel!

In addition to handling regular jobs at competitive prices Presteel has the engineering experience . . . the range of presses and modern equipment . . . to meet your most unusual requirements.

Here's an example . . . there are 350 godet rollers to a shaft and when two of these parts are face to face with nubs interlocking, they must hold a tiny rayon filament with just the right tension. Machining this part from solid bar and

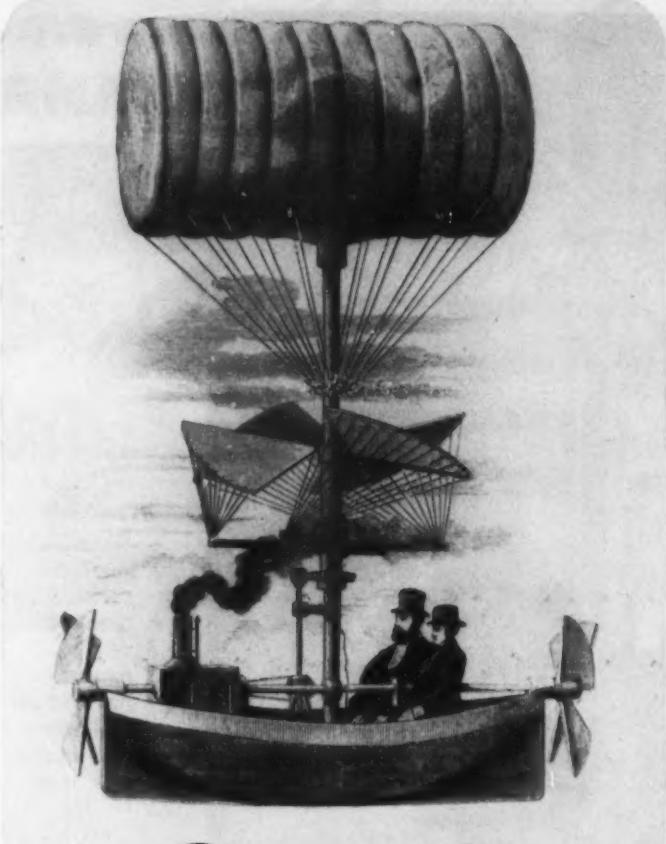
milling the 31 guide slots was *slow, laborious, costly* . . . but . . . it worked! Would you, in similar circumstances, risk a change? Our customer did! Result . . . astonishing savings per piece . . . 82% less weight . . . a new friend for Presteel!

When you are faced with a tough problem, stop worrying and start working with Presteel for a quick solution to your troubles.



WORCESTER PRESSED STEEL CO.

412 BARBER AVENUE
WORCESTER 6, MASS.



NEITHER

Fish NOR *Bowl...*

This novel invention by one Henry Badgley of Virginia was intended for "aerial navigation." The "motor" was supposed to turn propeller wheels at opposite ends of the boat to move it either forward or backward, and also turn a horizontal propeller wheel to help the balloon raise the boat.

The Bettman Archive

While Henry Badgley's conception of an aerial machine never reached the stage of mass production, his contribution to the development of power transmission machinery deserves passing tribute.

On the other hand, *practical* solutions to problems of power transmission have been the main concern of the Twin Disc Clutch Company over the past 31 years.

In the construction, lumber, petroleum, farm equipment, marine and machine tool fields—wherever power must be applied—

Twin Disc has engineered an answer to every problem.

**TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
(Hydraulic Division, Rockford, Illinois).**



Dear Editor

A LETTER FROM GERMANY

Recently I received a letter from the American Consulate at Bremen requesting me to send an affidavit of support from any relative or friend living in the United States, for obtaining a passport. Unfortunately, neither any relative nor friend of mine lives in the U. S. A., so my only chance to get such an affidavit is if any U. S. citizen

gives it to me. I have never asked any person to help me, but in this situation I am powerless to help myself.

If some owner of any ironmongery (hardware) would give the affidavit of support for my wife, daughter and me, I am sure to be able to pay it back after a comparatively short time, perhaps by working in the ironmongery of that gentleman as assistant worker.

Our reason for wanting to go to the United States is not only an economic one. We want to become American citizens because of the personal freedom that reigns in that country, and for the American way of life.

The matter of freedom was already the reason we left our home in the Russian Zone of Germany in May 1947. I was employed by the government there as deputy section leader until the NKVD forced me to sign a sheet "to help reach the target of the Soviet Union in Germany." We went at once to the British Zone, where I worked as an assistant in an electrical engineering factory until I picked up my present calling as manager of an ironmongery. We know there must be some person in the U. S. A. who will help us to realize our great desire if you will please deliver this letter into the right hands. I will need about a year to get more accurate knowledge of the English language, and during that time I'll work as an assistant worker until I can pick up my calling.

We would be very happy if you could help us get in touch with the right person, and it would be our best Christmas present if you could send any information to us.

I never was a member or an applicant of the former Nazi party or any organization of it. Of course, I am

LEAD the Imperishable Metal

**"Water is conducted in three ways,
either in streams, by means of
channels built to convey it,
or in leaden pipes."**

FROM A TREATISE WRITTEN IN 63 B.C. BY VITRUVIUS, ARCHITECT AND BUILDER OF THE ROMAN AQUEDUCTS

Photograph of a section of lead pipe dug up during excavations in Rome, in 1907. The inscription on the pipe, translated into English, reads: "(Manufacture of the) Emperor Caesar Augustus Vespasian under the charge of Callistus, freedman of the emperor, manager." As Vespasian reigned from 69 to 79 A.D., the pipe has been in the ground more than eighteen hundred years. No other material practical for the purpose would have endured like lead pipe.

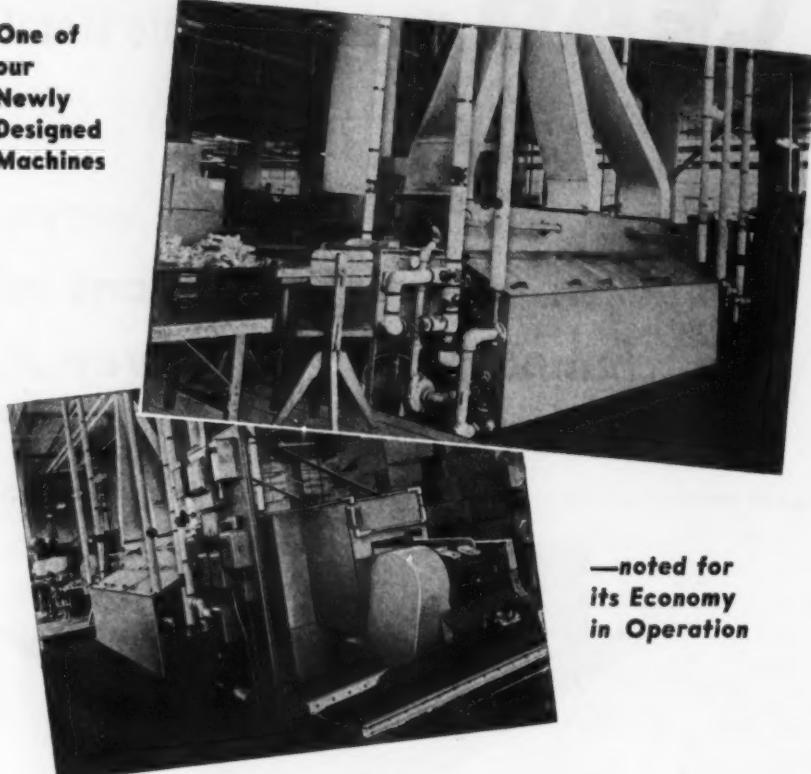


Lead, one of the first metals known to mankind, is the most durable of the common metals and has been a great aid in the development of civilization. The enormous quantity of lead pipe excavated in the ruins of ancient Rome, for example, indicates the extent to which the Romans used lead in their historically famous aqueducts and other water supply systems. These leaden pipes were made by bending sheet lead over a core and lapping the joint, which was hammered and firmly closed by soldering. Lead pipe up to one hundred inches in diameter have also been found in the ruins of ancient cities in Asia, Egypt and Greece.

Highly resistant to soil corrosion, lead—when buried directly in the soil—has many times the useful life of practically any other common metal. The imperishable qualities of lead, plus its pliability, account for the metal's extensive use in construction, as pipe and sheet, and for sheathing of telephone and power cable. As much as 280,000 tons of lead have been used for these purposes in a single year, and a considerable portion of this tonnage originated in the mines of the St. Joseph Lead Company—the largest producer of lead in the United States.

ST. JOSEPH LEAD COMPANY
THE LARGEST PRODUCER OF LEAD IN THE UNITED STATES
250 PARK AVENUE, NEW YORK 17, NEW YORK, ELDorado 5-3200

One of
our
Newly
Designed
Machines



METALWASH Belt Conveyor Type Machine for Cleaning Die Cast Meter Housings

- This machine, illustrated above, washes, rinses and dries intricate die cast electric meter housings, preparing them for successive operations.
- The prominent manufacturer, for whom this machine was constructed, is using it constantly and finds it highly satisfactory. Due to its speed and efficiency in the production line there is an increased output and a marked saving in time and labor.

Our
Engineering
Service
is at
Your
Command

- METALWASH Machines are equipped with special high pressure nozzles and powerful pumps of standard type, designed to handle the most difficult cleaning jobs in minimum time.

Let us show you how METALWASH Equipment can solve your metal cleaning and drying problems.

METALWASH MACHINERY CORP.
149 155 SHAW AVENUE IRVINGTON II NEW JERSEY

DEAR EDITOR

Continued

able to prove all my statements by showing papers before the American Consulate in Bremen.

HANS FREYER
Hauptkanal Links 61
(23) Papenburg (British Zone)
Germany

The photograph is of Mr. Freyer, who was born Sept. 17, 1919. His wife was born Feb. 7, 1923, and their daughter was born Aug. 20, 1943.—Ed.

STEEL EXTRUSION

Reference is made to the article entitled, "French Process Extrudes Steel," which appeared on p. 109 of the October 20 issue of THE IRON AGE. As you can well imagine this is of great interest to us. Our extrusion processes, to date, have been applied only to nonferrous metals. We will appreciate any further information on the new Ugine extrusion process that you might be able to procure.

L. A. DAVIS
Sales Engineer
Lombard Corp.,
Youngstown, Ohio

We do not have any information on the Ugine extrusion process other than that which appeared in the October 20 issue. You may have overlooked an article which appeared in the August 4 issue of THE IRON AGE entitled, "Cold Extrusion in Steel," which was based upon development work being conducted in this country. It is possible that this work has originated from the same German work from which was developed the Ugine process.—Ed.

TWIST DRILLS

We are one of your subscribers and would like to know if we could get documentation regarding the manufacturing of twist drills. We are looking for information regarding heat twisting and we think that the twisting in die plate would be cheapest.

GEORGES PEROT
Bureau D'Etudes Industrielles
Paris

So far as we know, nothing has been published on the manufacture of twist drills by means of heating and twisting plate stock.—Ed.

WELDING ELECTRODES

We should be very grateful if you would kindly send us a few copies of the new IRON AGE Charts on Arc Welding Electrodes which appeared in the February 24 issue.

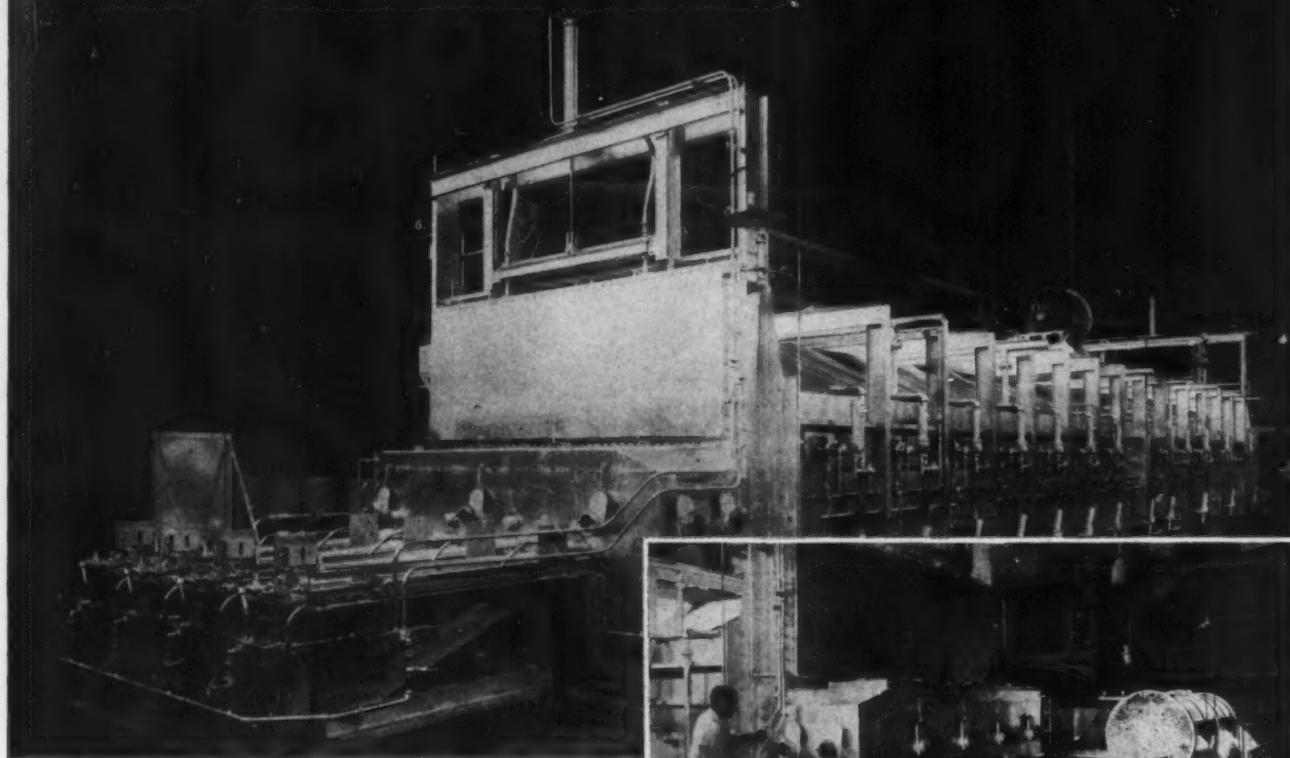
DR. MARIO SYGNORA
Director
Acciaierie e Ferriere Lombarde Falck
Milano, Italy

HOT STRIP MILL

There appeared in the May 19 issue an article entitled "Evolution of the Reversing Hot Strip Mill" by T. W. Lippert. We would appreciate receiving several copies.

G. H. REARICK
Superintendent, Welded Tube Div.
Babcock & Wilcox Co.
Alliance, Ohio

GAS MALLEABLEIZING



Continuous Gas-fired malleable Annealing Furnace with a production capacity of 375 tons monthly. 92 feet by 16 feet, it is fully automatic in operation.

Automatic discharge system emphasizes production-line characteristics of Gas Malleableizing Furnace.



Photos courtesy of Surface Combustion Corporation, Toledo, Ohio, Manufacturers of Industrial GAS Furnaces.

Continuous Cycle Annealing AT WALWORTH COMPANY DEMONSTRATES PROCESSING SPEED OF GAS

MALLEABLEIZING of cupola iron is just one of the production-cycle operations in which GAS demonstrates its economic importance in modern industrial practice.

Factual results of this method of malleable annealing can be found in the records of Walworth Company's foundry at Greensburg, Pennsylvania. The reduction in processing time and the resulting higher strength and ductility are substantial.

But this is only the first savings factor in controlled atmosphere processing with modern Gas-fired furnaces. Other factors include:

- reduction in amount of material tied-up in process
- absolute quality control of resulting product
- elimination of packing operation

- improvement in physical properties averaging 30% due to exact control
- control of malleableizing cycle to conform to production requirements

Important advantages, these—each a cost-control factor in the manufacture of Walworth valves, pipe-fittings, malleable castings.

Throughout industry you'll find examples of the economic advantages of GAS and modern Gas Equipment as important as those at Walworth Company. Efficient utilization of GAS in modern heat-processing is worthy of the continuous study your Gas Company Representative will help you make. Call him soon.



AMERICAN GAS ASSOCIATION

420 LEXINGTON AVE., NEW YORK 17, N.Y.

(Did you know that Kester makes over 100,000 sizes and types of flux-core solder?)



For over fifty years Kester has been concerned with producing solder for every phase of industrial work. Take advantage of this experience by consulting Kester's Technical Department on all soldering problems. There is no obligation.

FREE—Technical Solder Manual Available on Request

Send for Kester's new solder manual,
"SOLDER and Soldering Technique."

KESTER SOLDER COMPANY
4201 Wrightwood Avenue • Chicago 39, Illinois

Factories also at
Newark, New Jersey • Brantford, Canada



**KESTER
SOLDER**

DEAR EDITOR

Continued

STAMPING AND DRAWING

Can you give us any information concerning the new technique that permits stock to be painted in sheet form and then formed, without scratching the paint, as mentioned on page 11 of the October 27 issue?

L. MORITZ
Treasurer

A. Kremer, Inc.
Brooklyn, N. Y.

This is a development of the Glenn L. Martin Co., Baltimore, but no details have been released.—Ed.

FERROALLOYS

We would appreciate it if you would send us the latest available statistics showing domestic production of ferroalloys.

J. A. MIREL
Mercantile Metal & Ore Corp.
New York

The primary statistical source of this information is the U. S. Bureau of Mines, Dept. of the Interior, Washington 25, D. C. See also the Annual Statistical Report of the American Iron & Steel Institute.—Ed.

LOST WAX PROCESS

Kindly send us the symposium "Precision Investment Casting-Lost Wax Process" which has been recommended to us by the Halowax Products Div., Union Carbide & Carbon Corp.

E. TANDERO

Ragnar Hvoslef A/S
Oslo, Norway

A copy has been sent.—Ed.

HIGH-SPEED TOOL STEELS

We are desirous of obtaining two copies of each of the articles entitled, "Precision Hardening High-Speed Tool Steels," by N. K. Koebel, which appeared in the October 6 and 13 issues of THE IRON AGE.

P. W. OLIVER
Laboratory

Springfield Armory
Springfield, Mass.

WELDING ELECTRODES

Please send us several copies of the charts of arc welding electrodes. Payment is enclosed.

M. FISHER

Arc Mfg. Co., Ltd.
London, England

EQUIPMENT MFG.

We are particularly anxious to get in communication with the leading manufacturers in the United States of brass die casting, automatic polishing, and chromium plating equipment. Could you send the names and addresses of who you consider the leading firms dealing in these products?

J. T. COLMAN
Director

John Webb and Co., Ltd.
Birmingham, England

A list of manufacturers of this equipment has been sent.—Ed.

THE IRON AGE

FREE

PUBLICATIONS

Continued from Page 34

scribed and illustrated in 4-p. bulletin that includes examples of some typical irregular shapes such as Diesel locomotive plants, sprockets, grinding wheels, boom bars, crankshafts, machine and equipment frames, and ornamental pieces. *T. Ryerson & Son.* For more information, check No. 11 on the postcard on p. 35.

Bench Shaper

Bulletin 500 offers a complete description of the new 7-in. bench shaper and accompanying three-drawer steel stand, motors, and tools. *South Bend Lathe Works.* For more information, check No. 12 on the postcard on p. 35.

Speed Desiccators

The rapid cooling of heated samples to room temperature without moisture pickup in Dietert-Detroit speed desiccators is explained in 4-p. catalog. *Dietert-Detroit Products.* For more information, check No. 13 on the postcard on p. 35.

Insert Die Heads

Designed for cutting superior quality taper pipe threads, style TM insert chaser die head is described and illustrated in 4-p. catalog. *Eastern Machine Screw Corp.* For more information, check No. 14 on the postcard on p. 35.

Heavy-Duty Transmission

The sizes and capacities of the Fuller line of heavy-duty transmissions for commercial trucks are listed in 12-p. bulletin. *Fuller Mfg. Co.* For more information, check No. 15 on the postcard on p. 35.

Injection Molding

A procedural guide to the injection molding of Eastman cellulose acetate and cellulose acetate butyrate thermoplastics is available in



Handling Work is STOP and GO...

It's an intermittent service in which battery industrial trucks have many natural advantages. They start instantly, accelerate smoothly, operate quietly, give off no fumes, and consume no power during stops.



Battery trucks "deliver the goods" with double dependability when they are driven by EDISON Nickel - Iron - Alkaline Storage Batteries. With steel cell construction, an electrolyte which preserves steel, and a foolproof electrochemical principle of operation, they are the most durable, trouble-free and long-lived of all batteries.



If you do not already use EDISON, get a current price quotation . . . you will probably find initial cost *much lower than you think*; annual operating cost *less than you pay now!*

ADVANTAGES OF EDISON NICKEL-IRON-ALKALINE BATTERIES: They're mechanically durable; electrically foolproof; quickly and easily charged; simple to maintain; not injured by standing idle.



EDISON
Nickel - Iron - Alkaline
STORAGE BATTERIES

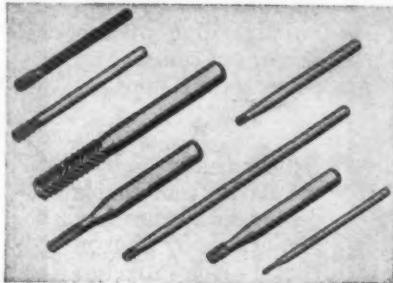


EDISON STORAGE BATTERY DIVISION
of Thomas A. Edison, Incorporated, West Orange, N. J.
In Canada: International Equipment Co., Ltd., Montreal and Toronto

IT COSTS LESS

to have your precision metal parts made by

TORRINGTON

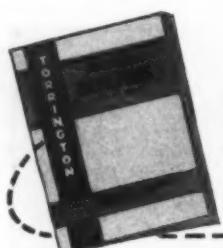


Special equipment and volume production enable us to save for you on a wide variety of precision parts made to order.

Typical are mandrels or spindles for mounted grinding wheels, abrasive points, felt wheels. Shank diameters to .500", close tolerances, centerless ground if desired. Chuck ends rounded, no burrs. Sharp, clear uniform knurls. Concentric tapers. Mandrels accurately hand-straightened.

Send your prints and specifications today for a prompt quotation, and ask for a copy of "Precision Metal Parts".

THE TORRINGTON COMPANY
Specialty Department
555 Field Street • Torrington, Conn.



Send coupon today
for your free copy
of this booklet.

Name _____
Firm _____
Address _____

FREE PUBLICATIONS

Continued

new 55-p. book, "Tenite Injection Molding," that contains detailed data on choice of material, proper product design, injection molding machines, mold design and construction, and various finishing operations. *Tennessee Eastman Corp.* For more information, check No. 16 on the postcard on p. 35.

Precision Thermometers

The Herco line of precision thermometers is described in 8-p. bulletin giving details, specifications, and prices. *Wm. Hergesell & Sons.* For more information, check No. 17 on the postcard on p. 35.

Motorized Hand Trucks

Industrial applications of Moto-Truc, a motorized hand truck, are illustrated and described in 8-p. bulletin. *Moto-Truc Co.* For more information, check No. 18 on the postcard on p. 35.

Protective Coating

Ircolene #19, a protective coating to prevent rust during shipping, storage, and production, is described in 2-p. bulletin. *International Rustproof Corp.* For more information, check No. 19 on the postcard on p. 35.

Industrial Clamp

A new 4-p. bulletin describes and shows applications of spring-type industrial clamp. *Hunter Spring Co.* For more information, check No. 20 on the postcard on p. 35.

Radiant-Tube Heating

The radiant-tube heating of controlled atmosphere heat furnaces is presented in 8-p. illustrated bulletin. *Holcroft & Co.* For more information, check No. 21 on the postcard on p. 35.

Snagging Wheel

New fibre-center snagging wheel designed to absorb most of the shock and vibration resulting from this type of grinding is described in 4-p. catalog. *Mid-West Abrasive Co.* For more information, check No. 22 on the postcard on p. 35.

Resume Your Reading on Page 35

**don't
scrap
metal
by turning!**



**...save by
Swaging**

on

**TORRINGTON
SWAGERS**



The Torrington Rotary Swaging Machine uses every bit of stock. With 4000 hammer blows a minute, swaging reduces, sizes, rounds, tapers and points rod, wire and tubing. It makes metal tougher and more resilient. It hammers away minor surface defects.

Torrington Swagers are built to a mechanical perfection based on our 42 years' swaging experience. Send today for your free copy of the illustrated booklet describing the machine and the method.

THE TORRINGTON COMPANY
Swager Department
555 Field Street • Torrington, Conn.



Send the coupon
today for your free
copy of this booklet.

Please send a copy of "The Torrington Swaging Machine" to:
Name _____
Firm _____
Address _____

NEW

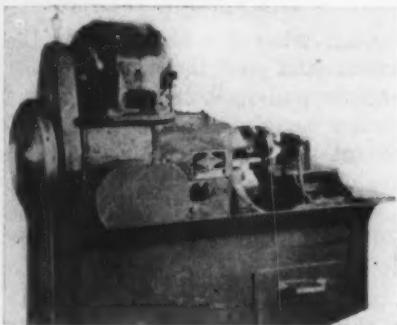
PRODUCTION IDEAS

Continued from Page 38

the door is filtered. An exhaust fan at the opposite end of the room keeps fresh air circulating so effectively, it is reported, that painters no longer need to wear a mask. These fans can be arranged to turn on automatically as the door is closed. *Kinnear Mfg. Co.* For more information, check No. 36 on the postcard on p. 35.

Single Spindle Pointer

A new machine for pointing work that can be held by the head, such as step bolts, hanger bolts, etc., makes points varying from a slight



bevel or rounded end to a sharp pointed cone. The capacity of the machine ranges from $\frac{1}{4}$ to $\frac{5}{8}$ in. diam and from 2 to 20 in. long. Feeding is by hand, the operator laying the blank in the stationary head holder and on the stock rest. The cam actuated cutter spindle is pulled back adequately to clear the work for easy loading. Production rates vary from 20 to 44 pieces per min, the change being made by pick off gears. Maximum feeding stroke is $\frac{3}{4}$ in. *Kent Machine Co.* For more information, check No. 37 on the postcard on p. 35.

Clutch Mechanism

The new Edgemont clutch mechanism for starting and stopping the flow of mechanical power incorporates an extended bronze bushed sleeve, tapered on the outside diameter to fit the tapered bore of the Worthington QD sheave. The new design eliminates the operations frequently necessary with



servicing—NO man-hours

repairs—NO man-hours



Maintenance Foreman Looks at **MONARCH SOLID TIRES**

It comes out zero for maintenance, no matter how you figure it—and that's not all. Monarch Solid Tires have an extra long service life, so they lower materials handling costs that way, too. They're tough, stable, surefooted, and they can't puncture—Monarch-equipped vehicles go anywhere in the plant.

Monarch specialization pays off for you in better industrial tires, including special types for specific applications, such as Monarch Easy-Roll, Cushion, Static Conductor, and Neoprene Tires.

Write for specific information on the application of Monarch Solid Tires in your plant. **THE MONARCH RUBBER CO.**, 301 Lincoln Park, HARTVILLE, OHIO.

Specify Monarch Solid Tires on your industrial vehicles. Monarch Tires for replacement available from the manufacturer of your equipment.



*Specialists in Industrial Solid Tires
and Molded Mechanical Rubber Goods*

**Practical Experience
PLUS
Unexcelled Facilities
in the FABRICATION
and
ERECTION
of
STRUCTURAL
STEEL
in every industry**



Steel plants, furniture plants, assembly plants, power plants, institutions, office buildings, bridges, wherever structural steel is used for new construction or additions to existing facilities—the Fort Pitt Bridge organization stands ready to assume the responsibility for fabrication and erection—backed by years of skill and experience and an outstanding reputation for dependability.

*"Steel Permits Streamlining Construction
with Safety, Endurance and Economy."*

FORT PITT BRIDGE WORKS

Member American Institute of Steel Construction

General Offices, Pittsburgh, Pa. . . Plant at Canonsburg, Pa.

BRANCH OFFICES

NEW YORK, N.Y. . . 441 Lexington Avenue
CLEVELAND, OHIO . . . Bulkley Building

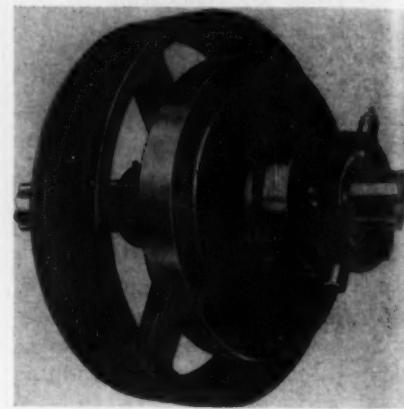
COLUMBUS, OHIO . . . Huntington Bank Bldg.
DETROIT, MICHIGAN . . . New Center Building



NEW PRODUCTION IDEAS

Continued

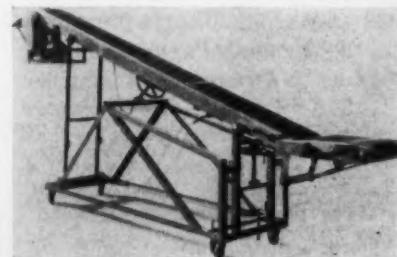
the old-style straight sleeve, in reborning the sheave, drilling and tapping into the web of extended sleeve bowl, and cutting keyways in both sleeve and sheave. To assemble the sheave on the sleeve it is necessary only to remove the grease



fitting, place the sheave over the taper, and use the standard QD sheave pull-up bolts to draw the sheave snugly into place. To demount the sheave, the same bolts are used as jack screws in the taps provided for that purpose. The clutch is installed between motor and driven machine, and may be engaged and disengaged at the will of the operator. *Edgemont Machine Co.* For more information, check No. 38 on the postcard on p. 35.

Belt Booster

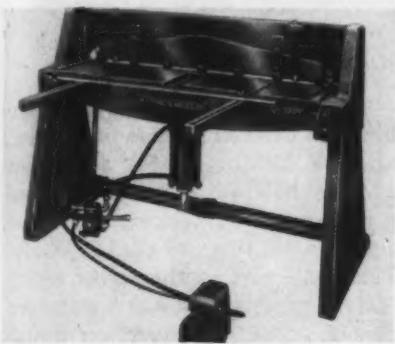
A new portable belt booster is primarily a floor-to-floor conveyer and stacker available with belts 6 to 36 in. wide x 12, 15, 18, 20 and 24 ft long. Either slider or roller



bed construction is available. The unit may be furnished with power-driven tail feeder and wheel or roller gravity section or nosed-over delivery. *Sage Equipment Co.* For more information, check No. 39 on the postcard on p. 35.

Squaring Shears

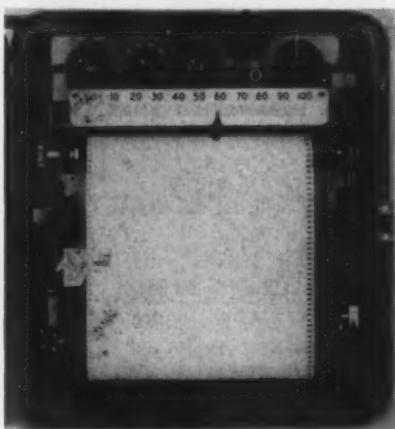
A line of air-power squaring shears includes shears with cutting lengths of 36, 42, 52, 72, 96 and 120 in. Shears of 72 in. and less shear up to 16 gage sheets; the 96-in. and 120-in. shears have a rated capacity of 18 gage. Each shear is equipped with air valve, cylinder and pilot valve and is ready for



operation when connected with the air supply line. Seventy-five to 85-lb air pressure is needed. *Wysong & Miles Co.* For more information, check No. 40 on the postcard on p. 35.

Strain Recorder

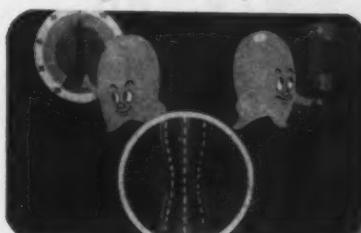
A new strip-chart strain recorder for use in stress analysis with SR-4R bonded resistance wire strain gages features easy readability with a 9½-in. wide chart scale, two chart speeds of 6 and 180 iph, and accommodations for a two-arm and four-arm strain bridge. Slowly varying strains can be recorded for



as long as 10 days without changing the chart. The instrument is a special adaptation of the Leeds & Northrup Speedomax Type G, Model S recorder with simple adjustments for strain gage characteristics, strain ranges, and for the Wheat-

Can Resistance Welding Cut YOUR ASSEMBLY COSTS?

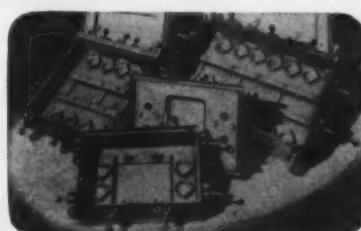
See this film and find out!



1. "THIS IS RESISTANCE WELDING", a full-color sound motion picture prepared by General Electric, will appeal to management, engineers, and shop men. Filmed with the layman in mind, this picture makes liberal use of cartoons (above) to simplify . . .



2 . . . the more technical aspects of resistance welding. Principal objective of the film, though, is to explain how resistance welding cuts fabricating and assembly costs. One application shown is the assembly of a blower rotor (above) where clearances . . .



3 . . . had always been a problem. Resistance welding cut manufacturing time by 75%! Another big saving dramatized in the film is the case of the switch boxes (above). These were formerly sand cast with holes individually located, drilled and tapped.



4. These are now completely welded on a continuous basis and production is up from a few hundred to 1000 units a day! The audience is also shown how another manufacturer welded studs on a steel cube frame-work (above) in one operation . . .



5 . . . instead of the seven formerly required! And for the cost-conscious executive, there's the story about the railroad that used resistance welding to save expensive seamless tubing (above). To give you a "preview" of this worthwhile film let us send you this . . .



6. RESISTANCE WELDING MANUAL . . . FREE! It's jam-packed with the kind of information on resistance welding you want. [Complete program consists of full-color 16mm film, manual, "highlights" booklets.] MAIL THE COUPON TODAY!

FREE
*to business
management!*

General Electric Co., Section B684-14
Schenectady 5, N. Y.

Attach to your business letterhead

Please send me a complimentary copy of the G-E Resistance Welding Manual (GES-3393). (Extra copies at regular manual price—\$1.00.)

I'd like to borrow a 16mm print of the film from your nearest film library.

Name _____ Title _____

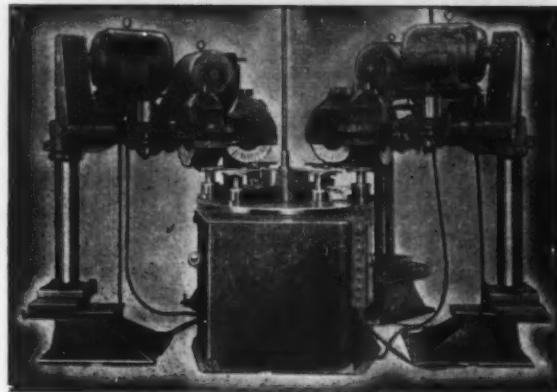
Company _____

Street _____

City _____ State _____

GENERAL ELECTRIC

ACME Indexing Type ROTARY AUTOMATIC



This photo shows a 40 inch ACME Rotary of the indexing type. It has individual variable speed drive for table indexing with a normal range of from 0 to 1200 indexes per hour. It is equipped with individual drive for chuck spindle speed and is shown with four ACME Adjustable Floating head polishing and buffering lathes. ACME Indexing Type Rotaries are built in standard sizes from 18 inch diameter tables to accommodate 2 buffering heads, up to 10 ft. diameter tables to handle up to 11 buffering heads.

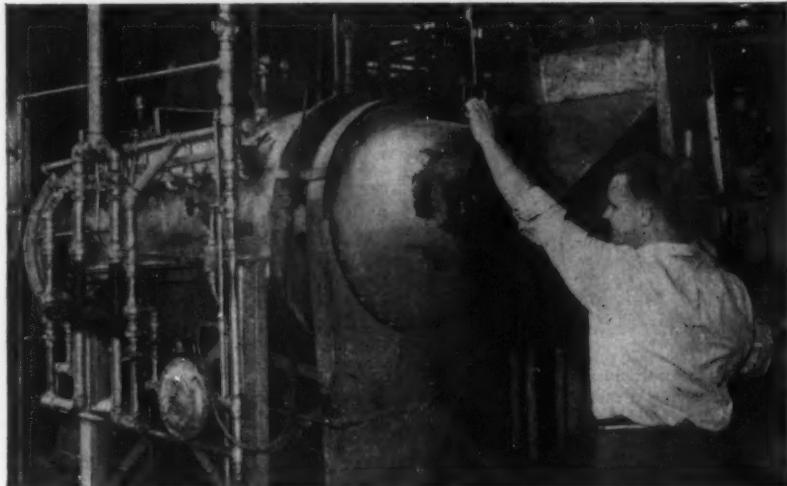
Polishing and Buffering Machines

ONE SECOND INDEXING TIME BETWEEN STATIONS

One second indexing time is a standard feature of all ACME Indexing Type Rotaries. Output can be standardized at high levels with uniform finish. Dwell time of wheel on work can be controlled as required while indexing time between stations is held to the one second interval.



ACME Manufacturing Co.
1645 HOWARD ST. DETROIT 16, MICH.
Builders of AUTOMATIC POLISHING AND BUFFERING MACHINES FOR OVER 35 YEARS



CONTINUOUS ROTARY HEAT TREATING FURNACES

For clean hardening, annealing, normalizing, carburizing, Ni-Carbing, etc., of many small parts.

The self-metering feed hopper arrangement permits the operator to pre load a one-half hour charge of work which is then continuously and uniformly processed without further attention, thereby eliminating costly man-hours. If desired, a continuous feeding mechanism may be employed which completely eliminates the need for an operator.

Write for Bulletin 801-4 today.



AMERICAN GAS FURNACE CO.

1004 LAFAYETTE ST.

ELIZABETH, N. J.

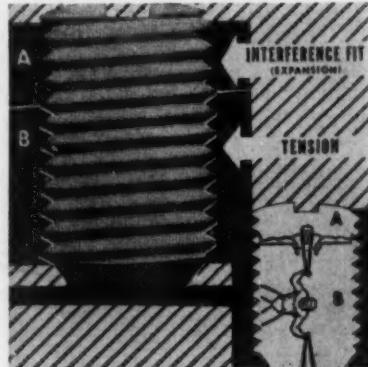
NEW PRODUCTION IDEAS

Continued

stone bridge circuit. A dc power supply is built into the recorder and a voltage regulator is supplied separately. Baldwin Locomotive Works. For more information, check No. 41 on the postcard on p. 35.

Self-Locking Screw

Triple-locking action by a combination of interference fit, tension and the locking of the set screw against the shaft or other part features a new self-locking set screw and adjusting screw called Zip-Grip. The lower part of the screw which enters the hole first, has a standard thread. The upper section designated as the activating area has a larger pitch diameter of the thread section that creates an interference fit or expansion effect against the thread flanks. This results in a tension or opposed-force action, causing the thread section of the upper part to be drawn downward and that of the lower part to be drawn upward, in the direction of the screw's locking action against the shaft. The screws are avail-



able in all metals with any type head. Set Screw & Mfg. Co. For more information, check No. 42 on the postcard on p. 35.

Cable Cutter

A downward circular cutting principle of a new portable, hand-operated cable cutter gives a slicing, rather than a pinching action to assure sharp, clean cuts of every cable strand at one stroke. A snap-action hold-down feature permits size adjustments to be easily made.

Tempilstiks®

the amazing
Crayons
that tell
temperatures



A simple method of controlling temperatures in:

- WELDING
- FLAME-CUTTING
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Also available in pellet and liquid form

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113	263	400	950	1500
125	275	450	1000	1550
138	288	500	1050	1600
150	300	550	1100	1650
163	313	600	1150	1700
175	325	650	1200	1750
188	338	700	1250	1800
200	350	750	1300	1850
213	363	800	1350	1900
225	375	850	1400	1950
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FREE —Tempilstik® "Basic Guide to Ferrous Metallurgy" — 16 1/4" by 21" plastic-laminated wall chart in color. Send for sample pellets, stating temperature of interest to you.

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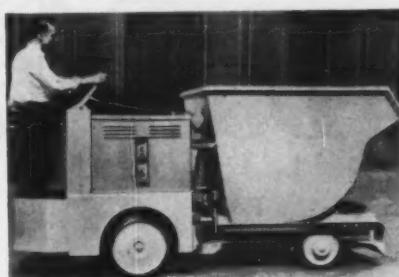
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Cutter blades are adjustable to compensate for wear and resharpening. All parts are interchangeable. Beverly Shear Mfg. Co. For more information, check No. 43 on the postcard on p. 35.

Dump Truck

A new electric end dump burden carrier truck has been designed for bulk handling. The body dumps by gravity when released by a lever



convenient to the operator's position. The body dumps cleanly and returns to lever latched position when emptied. Body capacity is 1 1/2 cu yd and the truck load capacity is rated at 6000 lb. The truck chassis has four-wheel lever type steering, double reduction drive axle, semi-elliptic spring suspension, and mechanical contactor travel controller. Mercury Mfg. Co. For more information, check No. 44 on the postcard on p. 35.

Drill Press

A portable drill press designed for use with any 3/8 to 1/2 in. electric drill weighs 26 lb and may be used as a shop tool, on the workbench, or may be dismounted to secure drill



press action in hard-to-reach spots. The drill is held in place by a patented clamp. Leverage is provided by anchoring the steel chain and applying pressure on the lever arm. Melamed-Hobbs, Inc. For more information, check No. 45 on the postcard on p. 35.

Resume Your Reading on Page 39

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to

BY THE CUBIC FOOT
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The Air Is Full Of It...

Without investment for equipment, you can extract your own oxygen from air and feed it direct from Air Products generators to your pipe line.

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ESTABLISHED 1873

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Dear Customer

by

Jack R. Knight

SECOND COUSIN — This column has just about completed its life span — it has now reproduced itself, fulfilling its obligation to the perpetuation of the race of columnists. If you are a reader of *Advertising Age*, or *Printer's Ink*, or *Industrial Marketing* you have been exposed to the descendant of this column, "Dear Customer" as you are reading it here has given birth to another column in those advertising trade papers which bears the same name, but with a slightly different purpose.

Horrid as the thought may be, our counterpart in the other papers is designed primarily as a flagrant bid for more advertising dollars for this magazine. The author has little to offer as to how he hopes to accomplish this. He has the advantage that in making up a paid advertisement he has money enough to buy a little drawing to go with each one.

FRUCTIFYING THINKER — There is a phrase for you. We met it coming out of J. Robert Oppenheimer's mouth in describing the Nobel Physics winner. We had to look it up, and have been waiting ever since for a chance to use this erudite utterance to describe a fruitful thinker.

Well, here goes. We nominate the guy who hit upon making our coming Jan. 5 issue a primary statistical work. Ever since this program was promulgated we have heard nothing but signs of violent activity over the partition in the editorial department. We thought that those editors, among

them, knew absolutely everything in the world of any importance. Apparently we were wrong. It has been necessary for them to do a little research on some subjects to fill in the gaps for this Fact Book.

SPECIAL BOOK AWARD — Among my many talents here is a standing as a professional judge and critic of company promotional material. Our viewpoint on this subject follows the reasoning of the famous Kansas City barrister, we don't have to prove that we know a lot about typography and design, we admit it.

Proceeding along this thesis, we wish to nominate here AND NOW, a book recently published by the F. J. Stokes Machine Company for the first of our sales promotion publishing awards. The book we have in mind is entitled "Powder Metallurgy Today," a subject near and dear to the heart of this company. An admirable restraint was shown, however, in making this an informational book, rather than making a sales pitch. And in addition, it is a handsome booklet. We're nominating it because we like it. From the standpoint of an interested reader, it is pleasing to the eye, inviting in appearance, simple to the uninitiated and appealing to all. It is far more than a discussion of a technical subject, it is a high class job in every way.

If whoever is responsible in either the company or their representative will step forward, we will be happy to present them with a handsome little blue book as a prize.

Willys Motors Developing A High-Compression Engine

Toledo—A new high-compression engine is in the advanced stages of development at Willys-Overland Motors, according to Delmar G. Roos, first vice-president of the company.

The new engine, which will be available in both four and six cylinders, is being readied for the Willys spring product program, Mr. Roos declared. While the new powerplant is approximately the same size as that in the current Willys line, it has an appreciable increase in horsepower and has some features which are revolutionary for American automotive engines, Mr. Roos said.

He said that tests now underway show a remarkable improvement in fuel economy, and that horsepower and torque per cu in. displacement compare very favorably with the best published results in Europe and the U. S.

The company has been experimenting with compression ratios as high as 8 to 1 in the new engine, Mr. Roos said.

Northwest Tube Expands Line

Portland, Ore.—Patents and stock of the Armstrong Heat Control Systems have been purchased by Northwest Tube & Metal Fabricators according to Harry L. Yater, vice-president of Northwest. D. C. Cranston, sales engineer for Northwest will be in charge of sales of the heat control systems, and it is anticipated nation-wide distribution of the product will be undertaken in the near future.

Strip Mill Will Operate in '50

Oakland, Calif.—Announcement has been made by F. M. Rich, vice-president in charge of operations, Kaiser Steel Corp., that his company's new electric weld pipe mill, which will be capable of producing pipe of from 5-in. to 14-in. in diam, and the new 86-in. hot strip mill will be in operation shortly after the first of the year.

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P. R. LYONS
Manager of Electrical Sales
H-VW-M COMPANY



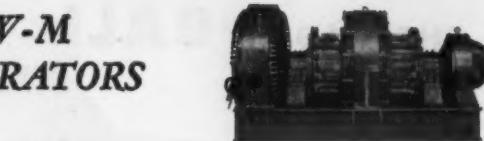
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Trouble-free commutation is achieved in H-VW-M low-voltage generators by such outstanding features as fully-insulated brush holders and rigging... use of copper pig-tail bars eliminates current passage through springs and fingers which in turn considerably increases brush life... one piece brass casting for correct brush box alignment... radial adjusted brush holders and rigging to provide firm and permanently correct positioning of the brushes.

H-VW-M generator brushes are made of special copper per graphite, constructed to insure highest conductivity along the path of the current. Moulded-in "equaload" shunts distribute brush load equally.

To these construction features are added such refinements as fan action of commutator risers to increase ventilation of field and rotor coils... rolled steel ring set within frame to lower center of gravity... liberal size, sleeve-type bearing to insure quiet, trouble-free life.

For increased efficiency and low cost power production investigate H-VW-M motor generator sets. You'll find the complete story in Bulletin G-102—yours for the asking.

FATIGUE CRACKS

Continued from Page 20

And we have a communication from Climax Molybdenum Co. to this department, we assume. It's addressed to "Fatigue Works, THE IRON AGE," an unconscious transposition by a tired typist who wholeheartedly believes that work fatigues.

Aprononyms

Top authority on engineering and construction on frozen soils found in the arctic and subarctic, known in the trade as Permafrost, is none other than Purdue University's Professor Robert E. Frost.

From C. C. Finn at our Seattle listening post we learn that A. D. Gass is the new district sales manager for Union Oil Co., one of the big gasoline firms.

Puzzler

In case you're still trying to figure out how many marbles little Roscoe had before he started scattering them around the landscape (Fatigue Cracks, December 8), the answer is 15.

Now hold your breath for the next befuddler: Three clocks respectively give time as 4 minutes past eight; 4 minutes to eight; 7 minutes past eight. If one is wrong by 6 minutes, one by 5 minutes, and one by 3 minutes, what is the right time?

Pumpkin Papers

Checking through your favorite family journal of January 30, 1873, we find a notice to the effect that:

"City subscribers will confer a favor upon the publisher by reporting at this office any delinquency on the part of carriers in delivering the Iron Age; also, the loss of any papers for which the carriers are responsible. Our carriers are instructed to deliver papers only to persons authorized to receive them, and not to throw them in hallways or upon stairs; and it is our desire and intention to enforce this rule in every instance."

In the light of the Hiss and Coplon trials, we thought Secretary of State Dean Acheson might like to consider posting a copy of the latter part of this notice in his department.

As for your f.f.j., it has long since turned the delivery problem over to Uncle Whiskers' men whom neither snow nor ice nor hail, etc., daunt. If, by chance, your copy doesn't come in on time, let us know by all means. Mail Traffic Manager Al Black will get it back on schedule in a jiffy — barring snow, ice and hail.

Resume Your Reading on Page 21

Enthusiastic Customers do our BEST advertising

Standard Pressed Steel Co., Jenkintown, Pa., uses No. 25 Grand Rapids Hydraulic Feed Surface Grinders in making the tools and dies that produce Unbrako Socket Screw Products, Flexloc Self-Locking Nuts, Hallowell Shop Equipment.

You will appreciate the micro-inch finish produced at production speeds on Grand Rapids Grinders. All Grand Rapids Hydraulic Feed Surface Grinders have these outstanding features:

1. One-piece column and base casting for vibrationless rigidity
2. Precision ball-bearing spindle which is greased for life
3. Bijur one-shot lubrication system eliminating hand oiling
4. Patented vertical movement of wheel head for quick, accurate adjustments
5. Portable coolant tank for ease of coolant replacement
6. Vane type hydraulic pump for fast longitudinal table travel

To our you—

Your inquiry concerning your specific grinding needs will receive prompt attention. Grand Rapids Grinders include: Hydraulic Feed Surface Grinders, Universal Cutters and Tool Grinders, Hand Feed Surface Grinders, Drill Grinders, Tap Grinders, and Combination Tap and Drill Grinders.

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COMPANY

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GRAND RAPIDS GRINDERS



DRAVO Counterflow HEATERS

Production lost while chilly employees cluster around a salamander soon pays for Dravo Counterflow Heaters for your foundry. Keep working-area warm—keep men at work.

A highly efficient way to provide tempered make-up air for plant ventilation as well.

Oil or gas-fired; readily switched from one to the other. Stainless steel combustion chamber, rugged mill-type construction. Fully automatic, easily installed. No duct work needed for large open areas. (80-85% efficiency). AGA and UL approved. Ask for Bulletin MG-523.

DRAVO CORPORATION

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You'll not only get the kind of work you want—you'll get the kind of service you like from Earle Gear. Because Earle Gear has long made it a policy to give you prompt and careful attention and to take an individual interest in your work. Our stock of gear patterns numbers over 40,000 and our assortment of cutters and hobs would be difficult to equal. Our facilities include the most efficient machinery available for cutting any type of gear in any diameter up to 30 feet from any practical material.

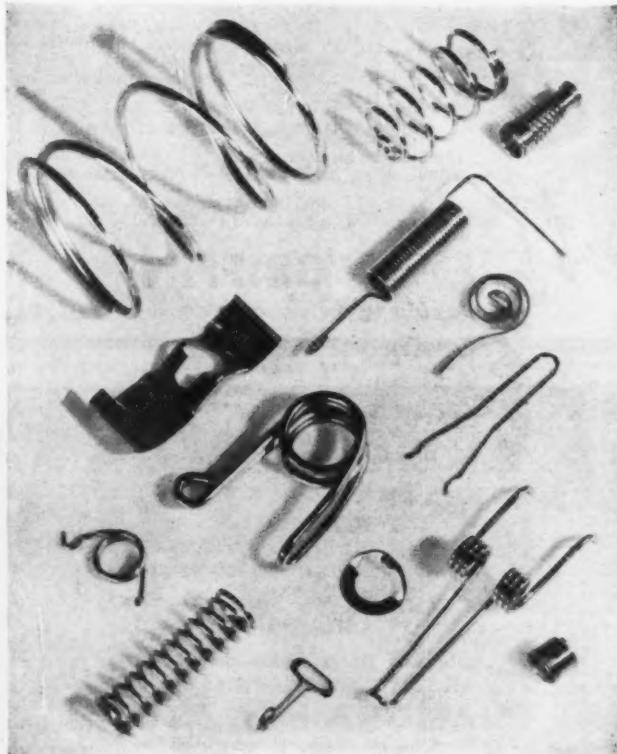
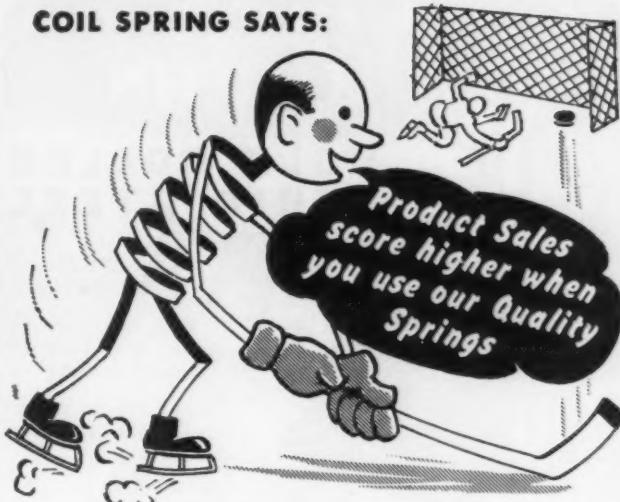
We've been in the gear business a long time—long enough to know that there's no substitute for good service. That's why you can do business with ease...with assurance...with Earle Gear.

Send us your prints, sketches, specifications or samples for quotation. THE EARLE GEAR & MACHINE CO., 4707 Stenton Avenue, Philadelphia 44, Pa. Sales Offices: New York City; Youngstown, Ohio.

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EARLE GEARS

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660 E. 82^D St. Cleveland, O.
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COTTER PINS — FLAT SPRING KEYS
— RIVETED KEYS —
WESTERN WIRE PRODUCTS CO.
ST. LOUIS, U.S.A.



Continued from Page 28

The threat of a rise in steel and coal prices comes from the failure of the nationalised railroads to pay their way. Their revenue deficiency for 1948 was \$13,300,000. They expect to incur a loss in the current year of \$56,000,000. To recoup the loss the Transport Commission proposes to get the money back from shippers by raising freight charges.

According to the Minister of Transport, the increased charges sought by the Commission will raise the transport cost of coal by between 14¢ and 56¢ a ton and steel by between \$1.12 and \$1.40 a ton.

Causes Grave Concern

Industrialists are alarmed by the proposals, which, they say, are of such magnitude that, if adopted, they must result in increases in the costs of a wide range of industrial products. This will give industry a severe setback just at a time when the greatest efforts are being made to reduce costs and prices.

Not only will the resulting increases in prices constitute a serious obstacle to the continued expansion of exports, but they will also contribute to an increase in the cost of living.

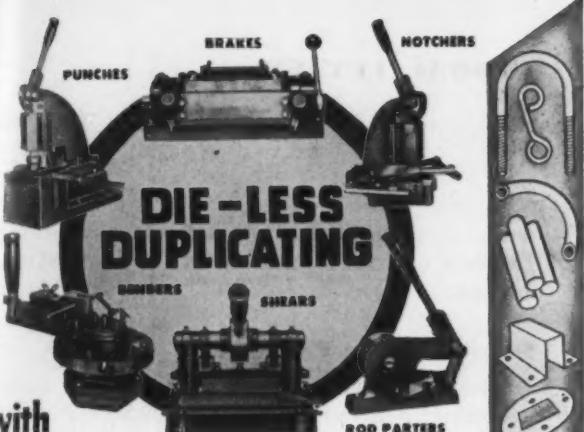
Explanations Sought

Industrial users of transport feel entitled to be satisfied on two main issues:

(1) That the most urgent and exhaustive examination will be made of possible operating economies before charges are increased. There are at least *prima facie* grounds for doubting if existing traffics justify an increase of more than 60,000 railway employees since the war. This should be examined.

(2) An explanation should be given as to why the increases fall wholly on freight traffic, while passenger traffic this time is not called upon to provide its share.

Canal freights and dock dues, besides rail charges, are to be increased. The body to decide whether the increases are justified is the Transport Tribunal, before which the railroad authority will have to argue its case. Therefore, although losses are now running at \$1,400,000 a



with

di-acro PRECISION MACHINES

Eliminate dies . . . speed production . . . in both your experimental and quantity run duplicating operations. An unusually wide variety of both simple and intricate parts can be precision made by "DIE-LESS DUPLICATING" with the individual or co-operative application of Di-ACRO Precision Machines (see examples at right). Di-ACRO Machines are now offered in a total of six types and 21 different sizes, including two new units—a power driven Shear and a hydraulic Bender.

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GLOBAL LETTER

Continued

week, it is unlikely that an increase in rail freights can take place before Feb. 1 at the earliest.

Seeking Higher Pay

The engineering workers are going ahead with their demand for an extra \$2.80 a week in spite of Sir Stafford Cripps and the Trades Union Council. The year's biggest wage demand—covering 2,500,000 engineering and shipbuilding workers—stands, and the whole of the Government's and T.U.C.'s wages policy, demanding complete restraint, is challenged.

Mr. H. G. Brotherton, chairman of the Confederation of Engineering and Shipbuilding Unions, in formally presenting the claim to the Engineering and Allied Employers' Federation, asserted that while workers had been asked to restrain demands, employers had not shown similar restraint in declaring profits. He argued that although production per man had climbed since 1946, wage increases have been negligible—but profits have soared.

Employers Answer Charge

The employers reply that profits have not been overlooked by Sir Stafford Cripps. As for general reserves, it is probably true that they have increased. But they are being used for running the business, and are represented by steel and iron and manufactured parts and not by liquid cash. They are the life blood of industry.

The change of Government in New Zealand, after 14 years of Labor rule, has shaken the Socialists and cheered the Tory party.

The U. K. government is meanwhile clearing the legislative decks for the general election, which most people now forecast for the month of February. No one really knows except Mr. Attlee and he will choose the time most favorable to his own party.

Brazil's Industry Is Expanding

Sao Paulo—During the first 9 months of 1949 one mining and 10 metalworking companies in the State of San Paulo raised their capital investment. The total increase amounted to approximately \$2 million.

During the same period three new metalworking companies, one mechanical engineering firm and three machine factories were founded in the State. In all, 91 new companies were registered in San Paulo with a total declared capital of \$13 million.

Resume Your Reading on Page 29

THE IRON AGE



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For immediate delivery from warehouse stock Stainless Steel Sheets, Strips, Bars, Tubing, Wire and Welding Rods
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THE MODERN TIN PLATE





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When welded together as shown, these two Bethlehem Cold-Formed Shapes provide a reinforced tubular sill for freight-elevator doors—a sill so sturdy that it can stand plenty of hard usage from trucks during loading and unloading operations. We make the shapes on brakes from (A) 11-gauge, and (B) 7-gauge sheet steel, and furnish them to the customer in various lengths.

Sills for freight-elevator doors . . . frames for house trailers . . . parts for ornamental railings . . . reinforcing for kitchen equipment . . . these are but a few of hundreds of widely-varied uses for Bethlehem Cold-Formed Shapes. And hardly a day passes but some alert manufacturer thinks up a new use for these versatile shapes.

Bethlehem Cold-Formed Shapes are made either from strip, sheet or plate steel. They are uniform in thickness, have an excellent strength-weight ratio,

and relatively scale-free surface. We make them in all gauges from 7 to 24, inclusive, and because of our special shop facilities we can meet virtually every requirement.

If you consider there might be a place in your manufacturing operations where Bethlehem Cold-Formed Shapes could be used to advantage, let us discuss possibilities with you. Your query to our nearest sales office will receive prompt attention.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

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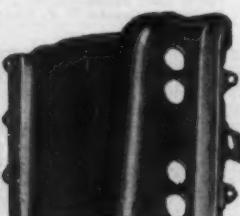
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